Here Comes the Sun

The evolution of a Prosuming Project within a social housing estate

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To Mark, Luc and Rosa,

This is most definitely a family project…I couldn't have done it without you all.

I hereby declare that this thesis has not been, and will not be, submitted in whole or in part to another University for the award of any other degree.

Signature:

……

Nicolette Fox October 2017

Abstract

Here Comes the Sun: The evolution of a Prosuming Project within a social housing estate

The thesis addresses the research question of how and why 'prosuming' solar electricity evolves over time among social housing tenants with prepayment electricity meters. Prosuming is defined here as deliberately and simultaneously producing and consuming electricity. Using a Social Practice Theory framework, but also drawing on Time Geography, the thesis analyses prosuming as a 'project'. This sees practitioners actively mobilising elements (meanings, skills and materials), as well as orchestrating everyday practices (i.e. laundering) and projects (i.e. 'Feeding-the-Meter') to the fulfilment of the 'Prosuming Project'.

The overarching research question is 'How and why does prosuming evolve for social housing tenants?' It is broken down into four subsidiary questions that firstly explore the period before solar panels, and then the three stages of the conceptual framework – adopting, establishing and committing to the Prosuming Project. The first question addresses how householders use electricity prior to the installation of solar panels and the role of two dominant, institutional projects: 'Feeding-the-Meter' and 'Maintaining-Family-Routines'. The second examines the features of households adopting the Prosuming Project and the need to mobilise a set of elements from within a disadvantaged community. The third question explores how the establishing phase is marked by a complex relationship between prosuming as a secondary, voluntary project, and dominant, institutional projects. This is further complicated by the role of synchronicity, finances and the changing seasons. The final subsidiary question addresses how a new vocabulary of elements emerged as practitioners committed to the Prosuming Project. It also explores how a transformative process took place both for practitioner and the project itself. In particular it highlights the potential in the future for an Energy Shifting, Storing, Saving & Sharing Project that could support disadvantaged communities, if they are able to mobilise the elements they need to perform it.

This case study adopts an in-depth qualitative methodology, using serial interviews with seven households over ten months. The interviewees live in an area that in 2010 was ranked as within the ten percent most deprived in England, according to English Indices of Deprivation (DCLG). The research explores their lived experiences of the Prosuming Project. The thesis focuses on UK social housing tenants, who appear not to have been researched before for a prosuming-focused, social practice study. This enables the research to contribute to topical debates about future sustainability 'winners and losers'. It also offers methodological insights into undertaking a social practice case study that explored lived experiences within a disadvantaged community. The research provides insights into how prosuming solar power is embedded in everyday life: how it can be supported or challenged by dominant projects, and how householders may develop new skills, understandings, and ways of using materials as their performances evolve.

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Preface - Knowing energy

Energy is a strange matter. According to physicists energy can neither be created nor destroyed…Whatever it is, energy is deeply implicated in all material and immaterial aspects of our being, including the quality of our everyday lives and experiences (Pierce and Paulos, 2010, p. 1).

As a child growing up in the countryside it was ice on the inside of the windows that told us just how cold it was in our house. It was also the wind blowing in the 'wrong' direction that warned us that we might have to boil a kettle rather than relying on a temperamental coke boiler for hot water. Knowing energy meant waking up your senses.

You could feel the frosty windowpanes and see the sun tracking round the house and bringing warmth to cold quarters. Hear the wind whistling around the house killing off fledging fires and smell the acrid soot being pushed back down the chimney. At the same time the living room fire provided warmth, cosiness and a focal point for family life. We learnt how to shape energy to our lives - washing clothes on sunny days so they could dry crisp perfecting techniques to keep the fire alive and always, across the winter, wearing layer upon layer.

But knowing energy was also about working out whether there were enough 50 pence pieces in the electricity meter to cook dinner. Or how long you could run an electric fire to take the chill off a room. It also involved careful budgeting so we could stockpile enough coins to ensure that we would not suddenly face a blackout when we had friends over.

I share my story because it is part of the doctoral journey I undertook. It was only when I was sitting listening to the stories from the families in my study, did I realise just how much I understood when they talked about the pressure of 'feeding' the prepayment electricity meter. Today I am very fortunate that my energy life is much more insulated both physically and metaphorically. I have not used a prepayment meter in decades and my open fire recreates the cosiness for the family, without the pressure of it being our main source of heat.

When I started out on my travels I assumed I would be researching and writing about the relationship between energy and behaviour. In particular, how this would influence an individual's take up of solar power. After all, in a sense, I had been trying for years as an environmental journalist and campaigner to encourage a change in attitudes and behaviours. Although, this was always with the caveat that it is difficult enough to change your own behaviour, let alone anyone else's.

Instead, as a doctoral researcher I found myself in a totally different world of social practices - the cooking, the cleaning, the hair drying - and how these play out in our daily lives with significant consequences for resource use. The journey has been stimulating, intellectually demanding and humbling because of the considerable generosity of the families I worked with on this study. Many had busy and complex lives and yet, despite this, they were always happy to share their solar experiences so others could benefit. I thank them whole-heartedly for the time they have given.

After the many hours of reading, writing and talking about energy demand, I realised that my experience of growing up was absolutely right - energy is deeply embedded in our day to day lives. And if we want to bring about change, then an understanding of such lives, from the people living them, should, surely be part of the solution.

Nicolette Fox October 2017

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Firstly, I want to again thank the seven households who generously gave so much time to enable me to follow their solar journeys - it was a privilege. I also want to thank the social housing landlord for supporting the research, as well as their solar installer. This study would not have been possible without this considerable help.

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I would like to thank my wider family including my sister Suzi, brother Jonathon, aunt Annette, cousin Robin, and father-in-law Brian. You also all know how much this would have meant to my mother Diane and mother-in-law Brenda who are in our thoughts.

I also want to highlight Deidre who has been so supportive, and of course Rachel and Astra, thanks so much for everything. Finally there are a whole host of people that have been there for me and the rest of the family. I want to thank Jack, Matt and Archie who never batted an eyelid when my laptop appeared, yet again, on our family holidays…But also to Paul for his encouragement and support, as well as Jo, Elsa, H, Moira, Bill, Michael, Jo, Caroline, David, Richard and Louise, again thank you….

PART ONE

CONTEXT, LITERATURE & THEORY

CHAPTER 1

INTRODUCTION

1 CONTEXT

1.1 Energy trilemma

The UK faces an energy 'trilemma': climate change, affordability and security of supply issues (Ekins and Watson, 2014; House of Lords, 2015). The Government sums up these challenges as "keeping the lights on, at an affordable price, while decarbonising our power system" (DECC, 2014, p. 4). However, the reality of this balancing act is not quite so easy (Ekins and Watson, 2014).

The first challenge focused on the environment is immense, given that the "energy sector makes a disproportionately large contribution to environmental problems…it accounts for two thirds of the radiative forcing from human activities leading to climate change" (Ekins and Watson, 2014, p. 5). In response to this the UK Government passed the 2008 Climate Change Act that set a legally binding target for 2050 of cutting emission by 80 percent relative to 1990 levels (Ares et al., 2016; House of Lords, 2015).

The second challenge is focused on the cost of energy - its "affordability" (Ekins and Watson, 2014, p. 5). The price of electricity rose by 61 percent over a 12 year period - 2004 to 2016 - while gas was even steeper with a 98 percent increase (Committee on Climate Change, 2017). However, despite these price increases household energy consumption and bills have in fact gone down as efficiency measures have increased over this period (Ibid.). Predictions for future energy price make similar assumptions that the increasing cost of energy will be offset by increased efficiency measures, both in the fabric of the home and appliances:

> The bill impact of shifting to low-carbon electricity will continue to increase slowly, but is likely to be more than offset by continued improvement in energy efficiency (Committeee on Climate Change, 2017, p. 7).

The third challenge, energy security, refers to a range of issues from depleting fossil fuels to aging power stations (Ekins and Watson, 2014). The likely electrification of the heating and transport sectors, in the pursuit of a low carbon economy, only looks set to complicate this picture. Additionally the "rapid expansion of variable renewables as a proportion of the UK's electricity generation creates challenges for security of supply unless flexibly managed" particularly at peak periods (House of Commons, 2016, p. 22).

1.2 'Winners & Losers'

All three energy challenges are intricately bound together and the price of energy is related to sustainability and security, as well as any trade-off between the two (House of Lords, 2015, p. 13). However, while the Committee on Climate Change (2017) argue that it is likely that any rises in the price of energy in the future will be offset by energy efficiency measures they also recognise that there is a potential issue for fuel poor households.

The Committee on Climate Change (2017) argue that in order to remove households from fuel poverty by 2030, the Government would need to double the insulation and low carbon heat installation funding that is currently available under the ECO - Energy Company Obligation – scheme . The Committee on Fuel Poverty also highlight that not only is more funding required, it also needs to be better targeted (BEIS, 2016). This reflects an early report by the Centre for Sustainable Energy for the Climate Change Committee, which warns that a transition to a low carbon energy system may not be so smooth for those most vulnerable in society (Thumim et al., 2014). Not only is there an issue of how to identify households vulnerable to fuel poverty, but also whether they will in fact benefit from energy efficiency and other related policies. As they argue, the recent policy of targeting fuel poor households does not leave much scope for confidence about the future:

> For example, the current paradigm of energy efficiency policy (specifically the ECO) that obligates suppliers to deliver measures typically result in 'least cost' approaches to delivery with focus on those areas where there are more opportunities for cost-effective measures (i.e. not solid walled properties) and where it is easier to deliver (i.e. not in rural areas)…(Thumim et al., 2014, p. 7).

There is an assumption from Government that to achieve zero emission by 2050 buildings will "need to become better insulated, use more energy efficient products and obtain their heating from low carbon sources" (HM Government, 2011, p. 5). And yet a report by Jamasb and Meier (2011) asserts that one of the reasons for higher spending on energy from fuel poor households is their reliance on older, less efficient appliances. They often buy second hand rather than the most efficient new appliances because of their low incomes (Jamasb and Meier, 2011, Boardman 2013). This highlights the complexity of understanding fuel poverty as Middlemiss writes:

> A focus on energy efficiency rather ignores the lived experience of fuel poverty. Fuel poverty can be driven by many factors other than energy inefficiency (high cost of energy, ill health, low or unreliable income, etc.) many of which are also hallmarks of poverty (Middlemiss, 2017, p. 430).

Walker refers to energy vulnerable households as potential sustainability "losers" (2013. p. 182) in the race to a low carbon world:

> This is not just a question of which supply side technologies might win. It is also a matter of which social groups stand to gain or lose in societies...whilst some people will be able to adopt lower carbon technologies and afford higher energy prices, others will find themselves excluded, or unable to escape the effects of infrastructural lock-in (Walker, 2013, p. 183).

Future "winners" (Walker, 2013, p. 182) may well have secure incomes and be able to afford energy efficient homes and appliances. Additionally, they may well have the means to produce their own power to offset any potential future rises in energy costs. Future 'losers' may well have insecure incomes (Middlemiss and Gillard, 2015) or find that energy efficiency schemes are not adequately funded (Committee on Climate Change, 2017) or targeted (Thumim et al., 2014). This could well lead them to increasingly being left out in the cold as they fail to keep up with the latest low carbon technologies (Walker, 2013).

1.3 Microgeneration

Such a scenario has the potential to create an " 'energy underclass' at continued or increased risk of fuel poverty" (Walker, 2008, p. 4514) that energy efficiency measures are unlikely to address on their own (Middlemiss, 2016; Preston et al., 2014). However, in recent years a number of studies have suggested another route to consider: giving low-income households access to technologies to produce their own renewable energy (e.g. Bahaj and James, 2007; O'Flaherty and Pinder, 2011; Saunders et al., 2012; Walker, 2008). Microgeneration covers a number of small-scale low carbon technologies for generating electricity or heat, including solar 'PV' - photovoltaic - panels, biomass boilers, solar thermal systems and micro-scale wind (Bahaj and James, 2007). The 2004 Energy Act defined 'micro' as less than 50 kW of electricity or 45 kW or thermal heat (Bergman and Eyre, 2011) with the average domestic PV installation at 4kWp (Energy Savings Trust, 2017). Brett and Staffel (2015) argue that such technologies have the opportunity to help reduce fuel poverty by reducing energy costs for individual households, at the same time as offering a "potential win-win-win" for the energy trilemma. They write that it is a "solid response to the mounting social and legal pressure to reduce CO2 emissions that also improves energy security by reducing fuel imports, and reduces the cost of energy to householders" (Brett and Staffell, 2015, p. 3).

The Energy Act 2008 gave the UK Government powers to introduced subsidises for the generation of small-scale renewable energy in the form of feed-in-tariffs that pay for each unit of electricity that is generated, as well as exported (Ares et al., 2016, p. 1). The initial tariff for solar PV was 43.1 pence per generated kWh of electricity for 25 years - high enough to attract sections of the media to recommend it as a good investment (Bulkeley et al., 2014). But who was taking advantage of this financial windfall?

While the Government's feed-in-tariff statistics do not include demographic data, a one-off report drew on an additional database to offer insights into this (DECC, 2012). Perhaps not surprisingly, given that

the costs of solar panels ran into thousands of pounds (Energy Savings Trust, 2017; Ingrams, 2017), it found that domestic installations were often on detached houses in affluent areas (DECC, 2012). However, what is more surprising is that a quarter of the domestic installations were in the least affluent areas of the country (DECC, 2012). As the report highlights, this was a result of multi-site owners – "aggregators" - installing large numbers of solar panels (DECC, 2012, p. 5). While the report does not detail who the aggregators are, a number would have been social housing landlords taking advantage of the feed-in-tariffs to invest in solar panels for their low income tenants, as well as receiving a return on their investment (Clark, 2014; Vaughan, 2016).

So successful was the initial take up of the Governments solar PV scheme that it has reduced the feed-in-tariffs approximately ten fold in the last seven years (Energy Savings Trust, 2017; Ingrams, 2017). Today the tariff for domestic solar generation maybe a fraction of the initial price paid, but during this period the cost of solar panel technology has also reduced (Ingrams, 2017). However, while these series of reductions appear to have initially dampened enthusiasm for investing in solar power, including from social housing landlords (Howard, 2015; Vaughan, 2016), overall the policy has significantly increased the capacity of renewable electricity - solar PV in particular. In 2008 - prior to the feed-in-tariff policy - the UK generated around 17 GWh from solar PV (DECC, 2011), by 2016 this had risen to over 10,000 GWh - around 3 percent of the total electricity generated (BEIS, 2017a).

1.4 Solar energy engagement

But the implementation of the Feed-in-Tariff was not just about the generation of low carbon energy, as important as it is. The UK Government also hoped it would offer a sea-change in how households view their energy use and "foster engagement and encourage behavioural change" (DECC, 2009, p. 43). The microgeneration technology that was most likely to make this happen was solar PV panels:

> The highly visible nature of PV and the direct and clear coupling between the resource (sunlight) and the level of power generation makes this microgeneration technology one of the best in terms of raising understanding of energy use (Bahaj and James, 2007, p. 2124).

The Government's Impact Assessment of the Feed-in-Tariff (DECC, 2011), highlighted that a key benefit of the policy was households undertaking "load shifting", in effect changing energy consumption to coincide with electricity production (Keirstead, 2007, p. 4131). Such a shift also has the potential to reduce demand on peak electricity periods, as Luthander et al highlight:

> Traditionally, electricity is generated at large-scale power plants and distributed to the consumers via a network of high and low-voltage transmission and distribution lines. Distributed generation, often intermittent such as small scale PV and micro-turbines, is often located closer to the consumers, resulting in a number of potential benefits such as reduced peak power consumption… (Luthander et al., 2015, p. 81).

Additionally, Bulkeley et al (2016) point out that under the current system, the more solar panels are installed, the more important it becomes to use the power at source rather than export:

> … 'un-used' solar power creates load on the network as it is exported during the day that could potentially place a strain on network infrastructure designed only to carry the power required by domestic household demand (Bulkeley et al., 2016, p. 9)

Load shifting not only benefits the network it can also benefit solar PV households. As the Energy Savings Trust write: "Sunlight is free, so once you've paid for the initial installation, your electricity costs will be reduced" (Energy Savings Trust, 2017). But in order to reduce electricity costs households need to access the solar power. One way to do this is to store your generated energy to use it at a more suitable time, for example during the evening. Until recently this was not an option for most solar PV households as the cost of batteries to store solar energy was prohibitively expensive, however, this looks set to change as prices reduce (Frankel and Wagner, 2017). Additionally, research and development into battery storage is accelerating, for example the UK Government has recently announced a £246 million investment into the technology (Topham, 2017). Meanwhile until solar battery storage is widely available, solar PV household will need to coincide their energy demand with solar generation (Luthander et al., 2015). In other words, they need to become simultaneous producers and consumers of solar energy – 'prosumers'.

1.5 Prosumers

The notion of the prosumer was first coined by Alvin Toffler (1980) and emerges from his analysis of three historical epochs or 'waves'. In the first agricultural wave, people were largely self-sufficient prosumers, producing and consuming their own food, clothes and other items of daily life; although some started to trade with others, such as the blacksmith (Kotler, 1986). As the industrial revolution and the second wave took hold, so production and consumption began to separate as people were paid for their labour and spent it on goods and services. This period is marked by goods being produced for exchange rather than home use (Kotler, 1986). Toffler argues, that we are currently in the midst of the post-industrial third wave as production and consumption merge as consumers undertake their own pregnancy tests, scan groceries in supermarkets and help themselves to petrol (Ritzer et al., 2012). Long before the emergence of the Internet, Toffler discussed the future role of the "electronic cottage"(1980, p. 204). As Ritzler points out, we now have a situation where the "ultimate social factories are the Web 2.0 sites where prosumers simultaneously consume and produce ideas on, for example, wikis, blogs…and social networking sites" (2012, p. 383).

Toffler (1980) applied his understanding of the three waves to the evolution of energy generation. In the first wave he explained how societies ran on renewable energy sources - such as water mills - as well as the "living batteries" of muscle power from animals and humans (Toffler, 1980, p. 39). The second wave saw an increasing dependence on finite sources of fossil fuels - gas, coal, oil - to power the

industrial revolution. In the third wave, he warned not only of diminishing supplies of fossil fuels but also of concerns over carbon dioxide emissions on our climate and predicts the rise of renewable energy and decentralised sources. Toffler (1980) ideas may have been developed nearly 40 years ago but many have not only withstood the test of time, they were also prescient (Ritzer et al., 2012) as Kesting and Bliek highlight:

> The Internet changed our world in less than a decade, when end-users were starting to deliver content to the Internet. Almost no communication channel or information source was unaffected. Similarly, prosumers could become energy up and down-loaders, delivering energy back to the grid during times that their energy production exceeds their energy consumption (Kesting and Bliek, 2013, p. 356).

1.6 Doing prosuming

And yet despite Toffler's interest in technologies, his book is by no means solely focused on them. Throughout he also foregrounds the social context with a particular focus on the "way ordinary people, in their daily lives, behave" (Toffler, 1980, p. 254). If Toffler was alive today, he may well be asking questions about how prosumers of solar power adapt their daily domestic routines to capture their electricity given a seasonal backdrop of changing weather and daylight hours. Or how prosuming influences their domestic lives and wellbeing, as well as what it entails to 'do' prosuming of solar power and how this evolves over time.

As Toffler writes "instead of ranking people by what they own, as the market ethic does, the prosumer ethic places a high value on **what they do…"**(1980, p. 397 emphasis added). This resonates with Social Practice Theory that is concerned with the **"doing"** of everyday life (Schatzki, 2002, p. 87, emphasis added). The washing, the cooking, the driving, the cleaning; the many domestic routines - 'social practices' - that punctuate and shape our daily lives. Life is therefore "lived **in the doing,** in the actual performance of practises, building up routines for this performance" (Hansen and Hauge, 2017, p. 3, emphasis added). Social practices exist not just because a few households undertake them occasionally, but generally because the 'doing' takes place at scale, with significant implications for energy demand. The National Grid can predict electricity peaks because so many of us turn on our lights and cook our evening meal when we return from work:

> Peak demand originates from a high level of synchronisation of activities happening in different households. High synchronisation can be seen as many people doing the same things at the same time. When synchronised activities are linked with appliances and devices which require energy, then these become of interest for peak demand purposes (Torriti, 2015, p. 4).

Social practices are embedded in our lives and are both created by, and reinforce, our daily rhythms - meal times, school runs, daily commuting, television shows and bedtime rituals. Powells et al. (2014)

argue that we need to understand what people do in order to understand how solar PV households access the solar power they are generating:

> This is particularly important in thinking about the socially shared and loosely orchestrated practices - such as cooking, laundry, dining and homecomings - that animate the early evening and in doing so create peaks in demand for power which are registered at every scale on the network, from individual street-scale feeders to the national demand curve (Powells et al., 2014, p. 44).

It is only in recent years that energy production and consumption 'prosuming' has started to emerge as a source of scholarship. Additionally, despite Toffler's approach as a social theorist, many energy scholars neglect to situate prosumption within a socio-technical framework (Ellsworth-Krebs and Reid, 2016). A review of energy literature conducted by Olkkonen et al highlighted that "energy prosumers are currently attracting the interest of researchers who examine the technical perspectives, especially engineering and information sciences" (2016, p. 3). In terms of the prosuming literature, very few journal articles see this as "fundamentally a social phenomenon" (Ibid.) Even those studies that do take a socio-technical perspective often frame this in terms of individual behaviours rather than seeing how energy consumption is deeply embedded in social practices (Strengers, 2013). However, there are three microgeneration studies that include this understanding when examining prosuming of solar power. Below I give a brief summary of each of these studies although, where relevant, I also draw on them at different points in the thesis:

1.6.1 A Finnish prosuming study

Olkkonen et al define an energy prosumer as "a consumer with a production device" (2016, p. 3). While they reference social practices, they also turn to co-production and stakeholder literature to investigate the relationship between prosumers and an energy company. The research draws on interviews with 12 owner-occupiers who had jointly invested in solar panels. The interviews took place after the solar panels were installed and covered motivations for householder's taking part in the solar scheme, their experiences of it, as well as insights into energy behaviours. These interviews were then followed up with four workshops that included an exploration of the relationship between prosumers and the energy company.

In summary, this study explored solar PV technology; 'winners' rather than 'losers'; a rural rather than urban context, and appears largely a static study of producing and consuming solar power, rather than examining it as an evolving phenomenon.

1.6.2 A Scottish prosuming study

Ellsworth-Krebs and Reid define energy prosuming as "when a household is simultaneously a producer and consumer of their heat and/or electricity via microgeneration" (2016, p. 1993). While they too refer

to social practices, they primarily use energy co-provision and prosuming literature to situate their research. While the study includes a focus on solar PV, it is only one of six microgeneration technologies examined. The researchers interviewed 28 rural households, 19 of which had solar PV in place. The interviews focused on the role of microgeneration on energy demand and everyday life; why households chose particular technologies; and the impact of these on their experiences.

In summary, this study examined solar PV as part of a wider group of technologies; 'winners' rather than 'losers'; a rural rather than urban context and focused on single rather than serial interviews.

1.6.3 A Danish prosuming study

Hansen and Hauge define a prosumer as a consumer who has "invested in micro-generation" to be a prosumer" (2017, p. 2). Additionally, their interviewees had access to home automation and information "that enables them to play an active role" (Ibid.). These researchers situate their study within Social Practice Theory and smart grid literatures. The researchers carried out one to one interviews with 20 rural Danish home owners, six months after the installation of a series of microgeneration and smart grid technologies by an "experimental lab where new technologies can be tested in the homes of real consumers" ((Hansen and Hauge, 2017, p. 7). This included solar PV but also electric cars, heat and power systems equipment for energy management. All the interviewees lived in detached houses. Additionally, 12 and then 18 months after installation, the researchers held workshops with the residents to further discuss their experiences.

In summary, this study included solar PV as part of a wider group of technologies they explored; 'winners' rather than 'losers'; a rural rather than urban context and unlike the other two studies was dynamic as it explored how prosuming changed over time.

1.6.4 Addressing the gaps

Each of these three studies has addressed energy prosuming in different ways by drawing on a range of literature. However they all, to varying degrees, linked prosuming to the performance of social practices in everyday life unlike many other studies looking at these issues. As Hansen and Hauge highlight, there are a "lack of studies on real life implications of being a prosumer" (2017, p. 2). Additionally, long term studies that explore the evolution of domestic energy practices are also "exceptional" (Hansen and Hauge, 2017, p. 1). Only Hansen and Hauge's (2017) study addressed the issue of how prosuming changed over time, although even in their case it started at least six months after solar PV installation so was not able to capture the initial period prior to and post installation of the microgeneration technologies. Additionally, all three studies focused on a rural rather than urban context, and owner-occupiers rather than tenants. The implication from the studies was that the interviewees were

reasonably affluent given their commitments to investing in microgeneration technologies. Thus all three studies appear to be examining potential sustainability 'winners' rather than 'losers'. Additionally, while all three studies included solar PV, only the one by Olkkonen et al (2016) focused solely on this technology.

These studies, and those in Chapter 2 examining microgeneration in the UK, offer a firm foundation for my research to be built upon, as well as providing clear gaps to be filled. My focus for the thesis includes the following:

- Exploring solar PV in depth and not diluting the study with the presence of other microgeneration technologies.
- Studying seven households living in social housing within an urban community with high levels of deprivation indices. Potential future sustainability 'losers' rather than the 'winners'.
- Designing a longitudinal, dynamic study that follows the tenants over four seasons - ten months - including interviews prior to and post installation of solar PV panels.

My thesis is also framed from within social practice literature. In particular, how producing and consuming solar power is deeply embedded in day-to-day routines - social practices - the cooking, the cleaning, the washing, and the bathing. This literature offers a distinctive lens that moves away from an assumption that such routines can be easily altered by changing attitudes or removing barriers such as lack of information or financial incentives (Hargreaves, 2011):

> Social Practice Theory thus diverts attention away from moments of individual decision making, and towards the 'doing' of various social practice… Bringing about pro-environmental patterns of consumption, therefore, does not depend upon educating or persuading individuals to make different decisions, but instead on transforming practices to make them more sustainable (Hargreaves, 2011, p. 83).

Additionally, I will draw on Time Geography literature, in particular the concept of institutional and voluntary projects and the role of different pathways that individuals follow not only across a day but also a lifetime (Hagerstrand, 1982; Pred, 1981, Pred, 1981a; Pred, 1981b). This literature will be combined with Social Practice Theory to highlight how project-practitioners 'mobilise' elements (Shove et al., 2012) and 'orchestrate' social practices (Shove et al., 2008; Watson and Shove, 2008) to the fulfilment of a project, as well as exploring the different pathways they can take on their prosuming journeys.

A definition of prosuming

There is very little agreement on what constitutes an energy prosumer with some scholars even seeing it as "a device or a building that produces energy, instead of the human who operates these devices"

(Olkkonen et al., 2016, p. 3). As seen above, even in studies that use social practice concepts, there are differences in how they define prosuming.

This study frames producing and consuming solar power as a project that households deliberately adopt. This includes mobilising elements and orchestrating social practices and other projects to the fulfilment of the 'Prosuming Project' (Shove et al., 2008; Watson and Shove, 2008). Combined, they are integrated into a 'project-as-performance' that enables individuals, or in social practice terms, 'practitioners', to simultaneously generate and consume solar power. In summary – the definition I have adopted for prosuming for this thesis is as follows:

"Prosuming is deliberately and simultaneously producing and consuming solar energy".

2 RESEARCH QUESTIONS

The literature review, discussed in Chapters 2 and 3, was used to develop a set of broad research questions that encompassed a number of "issues" that needed to be explored further as the study progressed (Stake, 1995, p. 29). These research questions, along with the evolving literature review and conceptual framework, were regularly revisited enabling "progressive focusing" during the research study (Stake, 1995, p. 29). From this iterative process, a dynamic theoretical framework was developed alongside an overarching research question made up of four subsidiary ones:

Overarching research question:

How and why does prosuming evolve for social housing tenants?

Subsidiary research questions

To answer the overarching research question, four subsidiary questions were posed that reflects the four empirical chapters 6,7,8 and 9.

1. What are the key energy related practices and projects **prior** to the emergence of the Prosuming Project?
2. What are the key features of the **adopting** stage of the Prosuming Project?
3. What are the key features of the **establishing** stage of the Prosuming Project?
4. What are the key features of the **committing** stage of the Prosuming Project?

3 CONTRIBUTIONS TO KNOWLEDGE

The study offers three contributions to knowledge: theoretical, empirical, and methodological which are detailed in Chapter 11 and summarised below:

3.1 Theoretical contribution

In summary, the theoretical contribution to knowledge helps to addresses the gap identified by Hui and Spurling (2013) for the need to explore the relationship over time between people, performances and practices. In order to address such issues I developed a Social Practice Theory conceptual framework that also drew on ideas from Time Geography. This dynamic framework focuses on people as project-practitioners that mobilise elements and orchestrate practices and projects over three stages: adopting, establishing and committing to a project. In so doing they navigate dominate, institutional projects, as well as secondary, individual ones, in their pursuit of the fulfilment of a project in daily and life pathways. The framework was developed by drawing on existing literature alongside the empirical findings of the research.

3.2 Empirical contribution

In summary, the empirical contribution to knowledge is focused on an in-depth examination of prosuming of solar power amongst social housing tenants across four seasons. As far as I am aware, there are no other qualitative studies that explore the evolution of prosuming within a disadvantaged community with multiple deprivation indices. In so doing, it also engages with potential 'losers' rather than the 'winners' in a future sustainability race by examining difficulties in adopting the Prosuming Project, as well as sustaining performances (Walker, 2013). It also offers insights into their lived experiences of the Prosuming Project and the variations in performances across three stages: adopting, establishing and committing to it. This resulted in the development of a typology of three types of project practitioners - tentative, periodic and transformative prosumers.

3.3 Methodological contribution

In summary I have responded to Hue's call (2014) for a set of resources to support the empirical exploration of practices in different social contexts. I offer up two contributions to such a resource. The first is a list of methodological insights that arose from the literature, as well as from my experience of conducing a social practice study in an area with high deprivation indices. The second is a set of seven commitments that addressed trustworthiness in terms of the research findings, and the responsibility I felt I had to the interviewees given the social and economic context of the research. This material evolved iteratively over the course of study, again both from the literature and the empirical study. Neither contribution is prescriptive and both are shared in the light of wanting to further open up this debate.

4 OUTLINE OF THESIS

Part one - Context, Literature & Theory

Chapter 2 Literature Review: Solar PV & Social Practices

This chapter examines the concept of 'prosuming' - producing and consuming - renewable energy by drawing on a number of empirical UK studies examining solar power. What emerged was that while most of the studies had a focus on individual behaviours, a small number had framed their findings by drawing on Social Practice Theory. The rest of the chapter then explores this theory that has a focus on everyday domestic activities such as cooking, washing, or gardening. It examines the concept of 'practice-as-entity' that has underpinned a large number of social practice studies as it can provide a focus on what is considered 'normal' in everyday domestic lives and the implications for resources. It is counterbalanced by 'practice-as-performance', which is much less utilised in empirical studies but offers the opportunity to explore variations in domestic practices, as well as diversity in the people undertaking them.

Chapter 3 Conceptual Framework: Pathways for Project-practitioners

This chapter focuses on the development of a conceptual framework that foregrounds practitioners and their social practice 'performances', in other words the 'doing' such as cooking, cleaning or driving. At the same time, it seeks to avoid falling into a trap of focusing on individual behaviours rather than the underlying social organisation of life through shared practices. While the framework is firmly built from Social Practice Theory, this chapter also introduces a number of concepts from Time Geography. The result is a conceptual framework for exploring project-practitioner pathways. This involves the practitioners mobilising elements and orchestrating practices to the fulfilment of a project, as well as exploring the different pathways they can take. This dynamic framework charts the evolution of practitioners across three stages: adopting, establishing and committing to a project. The final section argues that prosuming is a project that involves both the mobilisation of elements such as solar panels, as well as the orchestration of social practices, such as laundering, to its fulfilment.

Part Two - Research Design & Implementation

Chapter 4 Building the case study

This chapter seeks to turn the conceptual framework into a research design for an empirical study examining prosuming within the context of a social housing estate. It explores the key research themes coming out of the literature review and how this translated into a set of research questions. It also highlights the implications to the research in being underpinned by a social constructivist perspective.

A qualitative approach was adopted and applied to a case study methodology of a solar PV rollout programme on a low-income social housing estate. Serial interviews were employed as a method to collect the data from seven households over the ten-month longitudinal study.

Chapter 5 Commitments for Trustworthiness & Responsibility

This chapter problematises the concepts of reliability, validity and generalizability for qualitative research and draws on the notion of trustworthiness to judge its quality. When reflecting on these issues, what also emerged was the responsibility I had to my interviewees - particularly given the social and economic context of the study. The area for the research was located in one of the top ten percent of areas in the country for multiple deprivation indices. In response, I developed a set of seven commitments that underpinned the research that addressed issues of trustworthiness and responsibility.

Part Three - Findings & Discussion

Chapter 6 The Prologue - Life before the Prosuming Project

This chapter evolved from the desire to understand the lived experiences of the households prior the installation of solar PV panels in relation to energy demand - as people rather than as practitioners undertaking performances. It explores the context in which the solar panels were installed including living with prepayment electricity meters, as well the institutional influences of family and work. It reveals how energy demand is not seen by the households in terms of 'hotspots', because it is embedded in daily practices and projects. The research discovered two dominant, institutional projects that were significant to most of the families: Feeding-the-Meter and Maintaining-Family-Routines. While both emerged from institutional influences, they also met individual priorities for ensuring a constant supply of electricity for valued social practices, as well as supporting efforts to be a good parent.

Chapter 7 Adopting the Prosuming Project

This chapter is guided by the first stage of the conceptual framework - adoption. Its focus is on how the Prosuming Project came to be adopted by the seven households, and how individuals turned their first encounters into becoming practitioners. This process involved the mobilisation of elements (Shove et al., 2012), as well as the orchestration of practices and projects (Shove et al., 2008; Watson and Shove, 2008). It examines how elements had to be added to, transmuted and circulated to be integrated into performances that took place within the context of a social housing estate. What also emerged was that in order for the Prosuming Project to find space within busy daily paths, it needed to try and align itself with two dominant, institutional projects - Feeding-the-Meter and Maintaining-Family-Routines.

Chapter 8 Establishing the Prosuming Project

This chapter highlights how that the elements were initially more stable during this establishing period as the practitioners had mobilised and then integrated them into performances. However the dominant, institutional projects of Feeding-the-Meter and Maintaining-Family-Routines were active and both strengthened and undermined the fledgling Prosuming Project. This was manifest through the process of 'social-solar synchronisation' as many of the prosuming practitioners used the sun as a cue for performing their prosuming routines. However, this synchronisation started to break down as the seasons changed and with that a reduction in financial savings from the Prosuming Project. While in some practitioners this lead to a break from prosuming over the winter – in other words they were no longer deliberately and simultaneously producing and consuming solar power. However, for others, they used this period as an opportunity to deepen their practice and move to the committing stage.

Chapter 9 Committing to the Prosuming Project

This final empirical chapter also concludes the last stage of the conceptual framework. It explores how as practitioners committed to prosuming, new elements were needed as the project became not just seasonal but an all year round performance. In particular, it highlighted how practitioners again turned, in varying degrees, to the prepayment meter to develop knowledge - this time to understand how to perform the project over the winter. It also explores how a series of thresholds (Shove et al., 2012) were passed as practitioners committed to the practice. The critical threshold was the knitting together of prosuming with the dominant, institutional projects of Feeding-the-Meter and Maintaining-Family-Routines Project. However, there were two other thresholds that were needed for practitioner to fully commit to the Prosuming Project. The importance of financial rewards, alongside 'internal' rewards such as a reduction in stress (Shove et al., 2012). The other was the potential for practitioners to be able to innovate in relation to the Prosuming Project. What marks this stage out is the transformation that took place, not only of the practitioners but also the project itself as it started to evolve into a potential new project: 'Shifting-Storing-Saving & Sharing Energy.

4.3 Part Four - Conclusions

Chapter 10 Evolution of prosuming on a social housing estate

The penultimate chapter draws together the empirical findings to be able to answer the research questions. It starts by examining the four subsidiary research questions by highlighting the key features of adopting, establishing and committing to the Prosuming Project, as well as the period before the installation of solar PV panels. The chapter then pulls back the lens from the individual questions to present an aerial overview of the nine key themes that emerged from the findings that directly address how and why prosuming evolved for social housing tenants.

Chapter 11 Reflections and Implications

The concluding chapter of the thesis explores the study's theoretical, empirical and methodological contributions to knowledge. It then examines the limitations to the findings. Firstly, how could I be sure that my findings are authentic and resonate with the interviewees? Secondly, how could I ensure that my study of seven households could be trusted to inform policy? Thirdly, what was the influence of seasons on the findings and interpretation of the conceptual framework? Finally, I highlight a number of policy issues by exploring the three key elements of the Prosuming Project: materials, meanings and competences. Additionally, I argue for the importance of prosuming practitioners being drawn from many different social groups not just those who can afford solar panels. I end the thesis by suggesting that a Shifting-Storing-Saving & Sharing Energy Project may not be so far in the future, and with that its potential to address sustainability winners and losers.

CHAPTER 2

LITERATURE REVIEW: SOLAR PV & SOCIAL PRACTICES

1 INTRODUCTION

The **last chapter** briefly explained the background to the study including the energy trilemma and the issue of potential sustainability 'winners' and 'losers' in the move to a low carbon society. It explored how solar PV electricity could help to address the challenges of climate change and issues of energy security and affordability. However, in order for households to benefit from solar power, they need to simultaneously and deliberately undertake producing and consuming - prosuming - solar power. The chapter also highlighted the research gaps, research questions and contributions to knowledge. It ended with an overview of the structure and content of the thesis.

This chapter highlights the importance of understanding how solar energy is embedded in daily routines - 'social practices' - of households, following a review of a number of UK studies. The rest of the chapter is then devoted to exploring Social Practice Theory.

In more detail:

Section 2 is focused on reviewing a number of UK studies that feature solar PV. It explores key themes including the concept of a domestic 'double dividend' - not only the production of renewable energy, but also behaviour change based on information and financial rewards. Yet while there is some evidence of this, overall a much more complex picture emerges. Instead of a focus on behaviours, what appears more relevant to understanding the influence of domestic microgeneration, is how energy is deeply embedded in social practices.

Section 3 gives an introduction to Social Practice Theory. It offers a brief history of the theory and its focus on the everyday domestic activities such as cooking, washing, or gardening. It then considers the key concepts of practitioners and elements, and how underpinning the theory is the importance of socially derived meanings, skills and technologies, rather than individual behaviours.

Section 4 deepens this analysis by examining the recursive relationship between 'practice-as-entity' and 'practice-as-performance'. It explores how 'practice-as-entity' is a powerful analytical concept in

understanding changes to what we consider 'normal' in our everyday domestic lives, as well as the implications for resources. It argues that 'practice-as-performance' is also a powerful analytical concept through highlighting the variations in how practices are performed, as well as the diversity of people undertaking them. And yet despite the value of both concepts, less attention has been paid empirically to practice-as-performances. This has important implications for understanding issues of inequality - for example what social groups might be excluded from particular practices.

Section 5 concludes the chapter.

2 SOLAR PV STUDIES

The overarching research question is concerned with understanding the evolution of producing and consuming 'prosuming ' of solar energy in the context of social housing. However, as was discussed in the last chapter, there is a dearth of literature that looks directly at this phenomenon from a socio-technical perspective (Ellsworth-Krebs and Reid, 2016). Yet despite the lack of studies that directly examine prosuming, the concept underpins many of the more recent microgeneration solar PV studies in the UK:

> …there is a considerable amount of energy research, which does not explicitly adopt the term 'prosumption' or 'prosumer' yet is relevant to developing the concept of energy prosumption. Most notably, microgeneration…" (Ellsworth-Krebs and Reid, 2016, p. 1991).

Additionally, as Ritzer et al., point out that when exploring production and consumption "many scholars have dealt with this phenomenon in the past without labelling it prosumption" (2012, p. 380). As discussed in Chapter 1, microgeneration covers a range of technologies (Bahaj and James, 2007) which are situated close to, or at the site of consumption. What is more, in recent years there have been an increasing number of studies exploring issues of consumption rather than just the technical issues associated with microgeneration (Keirstead, 2005). They generally frame this activity in terms of shifting energy demand (Powells et al., 2014) or "load shifting" to coincide with generation (Keirstead, 2005, p. 1249). Given my interest in how producing and consuming solar power evolves amongst social housing tenants in Britain, I have drawn on a range of microgeneration studies to offer insights into my own study. These have been undertaken by Abi-Ghanem and Haggett, 2011; Baborska-Narozny et al., 2016; Bahaj and James, 2007; Bulkeley et al., 2014; Dobbyn and Thomas, 2005; Future Climate, 2015; Ellsworth-Krebs and Reid, 2016; Garrett, 2014; Keirstead, 2007; O'Flaherty and Pinder, 2011 and Saunders et al., 2012. As a group they span both qualitative and quantitative methodologies and home owners and tenants. They also all include a focus on solar power and have been conducted in the UK. Below I summarise the key issues from this research.

2.1 Double dividend

The overarching theme emerging from the literature is that microgeneration is not just about producing power but also offers the potential for households to change their relationship with energy. Keirstead terms this the "double dividend", offering benefits not only to individuals, but also to society:

> The total benefit of domestic photovoltaics comes not just from displacing fossil fuel generation, but because of its location within the home, there is a potential influence on energy consumption behaviour (e.g. load shifting, conservation, and changing purchase behaviour). Thus a positive behavioural response, leading to further energy conservation providing a 'double-dividend' for climate change… (Keirstead, 2005, p. 1249).

Keirstead (2007) conducted one of the first in-depth solar PV studies that moved away from primarily exploring technical issues or purchasing decisions, to examining consumer behaviour following installation. His study included a questionnaire with 118 UK PV households, and follow up interviews with 60 of them. All were fairly affluent and educated: 40 percent had an income of over £50,000, and three quarters had a degree. The results highlighted that a double-dividend was in evidence, as "two notable changes were seen: a six percent saving in the overall amount of electricity used and load-shifting to times of peak PV generation" (Keirstead, 2007, p. 4139).

Similar findings have been found in other studies. While Dobbyn and Thomas' (2005) qualitative study covered a range of microgeneration technologies, it included a similar cohort to Keirstead's (2007): seven affluent and environmentally aware solar PV households. This so called 'active' group, because they had purchased microgeneration technology, made the most of the power they were generating, but also made a conscious effort to reduce energy wastage. Given their prior environmental interests, this is not so surprising, but the authors also found some similarities with ten households living in social housing. They were defined as a 'passive' group, because they had been given the microgeneration technologies by their landlord. However, Dobbyn and Thomas' research suggests that living with such technologies can increase energy engagement, although it is important to be aware that only two of the households had solar PV.

> The passive households within the sample were perhaps the most striking examples of the potential impact of microgeneration… Living with the technology however seemed to encourage far greater understanding and awareness around energy issues and often had an impact on behaviours too… (Dobbyn and Thomas, 2005, p. 5).

These two studies also resonated with a case study of 12 solar PV households of owner occupiers taking part in a Government field trial of the technology (Abi-Ghanem and Haggett, 2011). The researchers too found such households "capable of engaging with the technology, in some cases realising energy savings and becoming increasingly aware of their energy consumption and general electricity use" (Abi-Ghanem and Haggett, 2011, p. 162).

Closely linked to the concept of the double dividend is the role of a financial motivation in engaging with solar PV. As Abi-Ghanem and Haggett highlighted, there is an assumption of "economic rationality when it comes to energy consumption" (2011, p. 155). Such a focus would initially appear to be justified from the findings of a large study in Durham of solar PV home owners (Bulkeley et al., 2016, 2014). The research, conducted with 31 solar PV households, found that the Government's feed-in-tariffs were highly significant in how households engaged with solar power. For example, a number of households kept detailed records of how much energy they were generating so they could work out the revenues they would receive from the Government. The authors related this to the socio-economic context of low interest rates and financial uncertainties:

> In most cases, PV was bought as a 'black box' financial product, much as would be the case with other financial investments such as bank or building society products, and whilst the flows of finance that it generated came to be understood in relation to household economies and future plans, the installation itself was of little interest …(Bulkeley et al., 2016, p. 16).

However, it is not just owner-occupiers who had access to feed-in-tariffs that saw the financial benefit of a solar PV system. A study of 23 households living in social housing concluded that solar power can "help to reduce the proportion of household income spent on energy costs and help protect residents against future rises in energy prices" (O'Flaherty and Pinder, 2011, p. iii). Similarly, another study that carried out 16 interviews with solar PV households who were in fuel poverty, found a reduction in energy bills by around a third (Saunders et al., 2012).

Additionally, the role of information was also highlighted in the literature as being relevant to how households engage with energy. For example, Abi-Ghanem and Haggett's (2011) solar PV study, explored two very different case studies. The first involved 12 owner-occupiers who had access to an energy information pack, a home visit and individual energy monitors for the solar PV panels (Abi-Ghanem and Haggett, 2011). The second case study involved 25 households of social housing tenants who also had access to solar power generated from panels installed on their block of flats. However, they did not have individual energy monitors, information packs or individual visits to explain the solar PV system. The result is that the majority of social housing tenants did not engage with the microgeneration nor benefit from the solar power. The authors concluded:

> …during the installation of microgeneration technologies in the domestic realm, attention should be paid to the ways in which users can engage with the technologies. This can be achieved through providing users with information on the technology and its design during installation (through clear documentation, home visits, etc.) (Abi-Ghanem and Haggett, 2011, p. 163).

Many of the studies raised the issue of information and its role in helping households engage with solar power. Thus the Dobbyn and Thomas study found that "When given more information about microgeneration there was some appeal of selling electricity back to the grid, especially amongst men. Some felt it might be quite exciting producing your own energy" (2005, p. 29).

2.2 A complex picture

Different users

And yet a focus on the double dividend and the role of finances and information in bringing it about is more complex than first appears. Invariably people do not live up to the ideal of a PV user that is "framed around the classic deficit model (Owens, 2000), which calls for energy education" and underpinned by an "assumed economic rationality when it comes to energy consumption" (Abi-Ghanem and Haggett, 2011, p. 155). Abi-Ghanem and Haggett's research with solar PV households highlights this complexity by identifying a number of users and non-users of solar energy including "conscious", and "opportunistic" types (2011, pp. 155–156). Arguably, the conscious solar users are most similar to Keirstead's double-dividend households (2005). They not only shifted their energy consumption to match the free solar power, but also reduced it. Yet, the researchers found that while a financial incentive was relevant, it was by no means the only influence:

> Their interest was not only economic, but was also related to their attitudes towards wastage and their preferences regarding what constitutes a comfortable and welcoming home (Abi-Ghanem and Haggett, 2011, p. 157).

A similar finding emerged from other studies that too discovered that generating power could offer benefits other than just saving money. Ellsworth-Krebs and Reid study of 28 microgeneration households highlighted how in addition to "exchange values", solar power also offered "use values" (2016, p. 1992).

> The aim of creating exchange value is so that the product can be sold to others; whereas, use value can be created through enjoying the outcome and/or taking part in the process of production… (Ellsworth-Krebs and Reid, 2016, p. 1992).

Use value can be realised in many different ways from the satisfaction of taking a bath with your own solar hot water, to enjoying the physicality of cutting wood for a wood-burning stove. The act of being "involved in production adds value to the act of consumption (e.g. use value), which is not simply related to financial considerations or savings (e.g. exchange value)" (Ellsworth-Krebs and Reid, 2016, p. 1996).

Dobbyn and Thomas (2004) found that a number of households with microgeneration began to relate differently to energy. The authors wrote that it provided a "tangible hook to engage householders emotionally with the issue of energy use", in part because of the wonder of being able to create their own power from the sun (Dobbyn and Thomas, 2005, p. 7). Strengers too highlights the emotional connection that could be made with energy that is made at home (Strengers, 2013). However, she argues that this connection develops because of particular characteristics of renewable energy rather than emerging from changes to behaviour. Thus the "fact that energy has been 'handmade' renders it a limited and valuable resource - or rather a resource that must be used resourcefully… not brought

about through changes in individuals' attitudes, values or opinions (although these have been shown to change as a result of direct experiences with resources)" (Strengers, 2013, p. 146).

But it was not just conscious users that had a complex relationship with solar power, so too did the opportunistic users identified in Abi-Ghanem and Haggett's study (2011). Like the conscious users, this group also carried out load shifting to ensure their energy consumption coincided with solar power production, but, unlike them, they also used their solar power to justify their high electrical consumption. In some cases this was new energy consumption - such as the woman who after she had a baby started to use the solar power to run her tumble dryer because of its convenience. While others households simply saw the solar power as a way of maintaining existing consumption levels without "an increase in the energy bill" (Abi-Ghanem and Haggett, 2011, p. 159). Both conscious and opportunistic users appear in other studies, such as one focused on 19 solar PV homeowners in Scotland (Ellsworth-Krebs and Reid, 2016). This highlighted that the double dividend was in evidence but also, again, the counter trend: engaging with solar PV to increase electrical consumption:

> As ours and multiple other studies on microgeneration have also found… being an energy prosumer can lead householders to use more electricity or heat because of the perception that this energy is 'free' (Ellsworth-Krebs and Reid, 2016, p. 2001).

Baborska-Narozny et al's (2016) study of a co-housing community also explored the impact of solar PV power on 20 individual households. The eco community was keen to have solar panels installed, as they were congruent with their low carbon ethos. However, what became apparent through this research, was that many of the households were opportunistic not conscious users despite the environmental credentials of the community they were living in. Although, in this case, there was an important difference, these households started from a low energy consumption base, and sought out new gadgets to increase their use of 'free' solar power:

> Importantly, with this type of 'rebound' approach, additional appliances that would otherwise be regarded as unnecessary, like an icecream maker, become the desired 'solar-powered gadgets' that help consume more of the 'free' electricity (Baborska-Narozny et al., 2016, p. 34).

Different meanings

What the literature reveals is not only different types of solar users, but also different meanings as to what constitutes "good solar conduct" (Bulkeley et al., 2016, p. 19). For example, the eco community study reveals confusion around what is considered good solar conduct. Arguably, its members felt their solar engagement was in keeping with their environmental ethos. As one said: "I'm quite a low-user of energy but also I'm aware that I'm generating a lot of energy. I'm happy to still use the energy as well. I feel less guilty about using energy because I'm already generating it' (Baborska-Narozny et al., 2016, p. 34). Yet the authors of the paper did not have such a positive view. Instead they felt that for "pioneering eco-residents" the goal "**should have** been…to lower peak demand on grid by

introduction of load shifting", as well as maintaining low energy consumption (Baborska-Narozny et al., 2016, p. 35 emphasis added). They point out that such an approach evolved within the context of a policy framework focused on promoting financial rather than environmental gains:

> Policy and practice which puts PV systems only into a monetary context of FIT and maximises the use of 'free' electricity suggests lack of awareness of other energy factors which need examining. The way new technology is presented to the public, from national policy level down to suppliers' marketing strategy and professional advice, has complex 're-bound' consequences (Baborska-Narozny et al., 2016, p. 36).

But if good solar conduct is not about encouraging the opportunistic use of renewable energy, what about within the context of households vulnerable to fuel poverty? Conversely, Saunders et al (2012) saw increased energy consumption as a key benefit for low income households with access to solar power. Such benefits could arise directly by ensuring the simultaneous production and consumption of energy - in other words load shifting. Or alternatively indirectly, by spending financial savings from the solar power on other energy demands, such as space heating. However, despite highlighting the benefits of increasing energy consumption through solar power, there is still an air of confusion as to what makes good solar conduct, as a quote from a community organiser illustrates: "Behavioural work is often the biggest challenge - the hardware installation can be the easy bit but how to get it used wisely is trickier" (Saunders et al 2012 p86).

It is not clear from the paper just how fuel poor households should use solar power 'wisely'. For example, should they follow the path of the conscious user and cut energy use, or become an opportunistic user and increase their energy consumption? Even though the authors did not use the terms, it appears that both types of solar users were present in their study:

> Anecdotal evidence is contradictory, with one resident explaining how they might run their appliances more during the day, when the PV output is most, to maximise savings (IN06, 2010), while another talked more about being able to run appliances more, now that her bills were being reduced…(Saunders et al., 2012, p. 86).

In another paper exploring households vulnerable to fuel poverty, the authors are more explicit about what does not constitute good solar conduct (Bahaj and James, 2007). They expressed how "disappointing" (Bahaj and James, 2007, p. 2133) it was that energy consumption went up for the vast majority of the households during the study:

> During site visits, the authors have noticed an increase in proliferation of consumer electronic devices within the properties, notably large screen televisions and computers with 'always on' broadband connections… (Bahaj and James, 2007, p. 2133).

Arguably, the energy consumption could have gone up because the households became opportunistic users to mitigate fuel poverty, although the researchers found little evidence of load switching "despite the financial incentive to utilise PV generated energy locally…" … (Bahaj and James, 2007, p. 2135).

This too was the case in the Bulkeley study where households "owning a PV array had not led them to modify their major household practices" (Bulkeley et al., 2016, p. 16). Like Baborska-Narozny et al, Bulkeley (2016) sees this in part as a result of Government's feed-in-tariff policy that encouraged generation rather than solar consumption that could help address peak energy demand. In other words the "investment logic of PV in turn serves to create a focus on maximising generation with little regard for whether power is exported or used on site" (Bulkeley et al., 2016, p. 16). Similar to Baborska-Narozny et al's paper, the authors argue that future good solar conduct should be focused on shifting energy demand to coincide with solar power generation. They see this as beginning to happen following a series of reductions to the feed-in-tariffs paid out to solar PV owners (Energy Savings Trust, 2017; Ingrams, 2017). Thus in this shifting policy context " 'good' electricity conduct is increasingly being regarded as that which minimises the import of non- solar electricity into the home and maximises its local use" (Bulkeley et al., 2016, p. 20). Although in the future as the UK moves to a low carbon electricity system, Bulkeley et al., (2016) argue that reducing consumption may well need to be encouraged as well as load shifting.

Different routines

However, Bulkeley et al. (2016) argue that such changes will not come about simply by changing awareness, for example as to the benefits of domestic solar PV. Such changes need to be understood within a framework that shines a light on how good solar conduct resonates, or not, with everyday life:

> …as new ideas of what 'good' and 'valuable' forms of solar generation and use come to be circulated and normalised as part of the self-governing of PV, households seek to translate these ideas in relation to their use of the existing socio-material fabric of the home (Bulkeley et al., 2016, p. 18).

The Bahaj and James (2007) study illustrates this point. The households in their study were all given information packs about how to get the most out of the panels, as well as having individual discussions on their own energy generation, consumption and solar electricity export patterns. And yet, as discussed above, most households did not follow the advice or, if they did, it only lasted a few months before they returned to their old routines and energy consumption. Despite this, the authors still believed that this was the best route to encouraging households to change their behaviours:

> In early 2006, all nine houses will be offered an 'energy audit' by the research team to reinforce the 'energy message.' It is hoped that this process will reverse the significant electricity consumption increases observed over the described 12-month period (Bahaj and James, 2007, p. 2135).

And yet the different energy profiles of the households raise questions about the potential limitations of energy messages bringing about change. For example, one household had very "peaky" (ibid) energy demand that included high electricity use during the peak morning and evening periods. The profile suggested that this was likely to be caused by high power, long use appliances, such as a washing

machine or tumble dryer. Given this profile, the authors suggested that there is "scope for load shifting, with the morning loads in particular missing the peak of the solar day by around 4 h" (Bahaj and James, 2007, p. 2130).

But how is it possible to know the potential for load shifting? The paper by Bahaj and James (2007) gives no idea as to how energy is embedded in the daily routines of this home. For example, how many people live in the household; whether they have children, or how much time they spend at home during the day. Critically, how feasible is it for the households to wash their clothes at lunchtime rather than breakfast - maybe they are at work at that time? In other words, what is missing is "how energy consumption takes place within a wide socio-technical landscape, consisting of complex and interconnected everyday practices" (Abi-Ghanem and Haggett, 2011, p. 154). The Bahaj and James study (2007) highlights that even individual discussions with the researchers about their household energy profiles, did not significantly change their domestic routines or last that long. Given this, it is not clear how an energy audit will reverse this situation.

Such a view is far from uncommon amongst solar PV studies. For example, the most extensive UK study of domestic solar PV systems argued that energy behaviour change in households could be adopted "easily through service contracts and easy-to-understand hand-outs" (Munzinger et al., 2006, p. 107). As the Bahaj and James (2007) study showed, along with the social housing tenants in Abi-Ghanem and Haggett's study (2011), it is far from easy to change behaviours as they, like energy, are deeply embedded in daily routines.

What is more, a number of studies have shown that households can still benefit from solar power, even when they have poor information. For example, a Citizen's Advice Bureau study, which included telephone interviews with 57 solar PV social housing tenants, found that while many of them had not actively changed their behaviour or understood how best to use the solar PV system, they had still saved money:

> …66 per cent of social housing tenants noticed their bills getting lower. This is a positive result, given relatively few tenants consciously changed their behaviour regarding energy use and do not feel they have had information about how to get the most out of their solar PV systems (Future Climate, 2015, p. 66).

This again points to the importance of exploring how people use energy in their daily lives. It might be, in some of these cases that the people were at home during the day and continued to use their washing machine as they always had, but now started to benefit from the free solar power. Or alternatively, another possibility is that the tenants worked out how to use the solar power themselves by linking their routines to their bills. This appeared to be the case in the eco-community (Baborska-Narozny et al., 2016). Despite lack of information the households still managed to work out how to benefit from

the solar power - although in this case, the researchers questioned the value of this approach that they saw as ad-hoc:

> In terms of actual adaptation of electricity consumption practices to PV, no systematic behaviour was reported by the vast majority of residents other than doing laundry during daylight hours (Baborska-Narozny et al., 2016, p. 34).

The researchers went on to list a number of new routines that some of the households had adopted including boiling water and storing it in flasks. However, ultimately the authors were critical of all these attempts, including changes to laundering as "none of these practices were grounded in any calculations or checked against their real impact on electricity consumption and **remained on a random, intuitive level**." (Baborska-Narozny et al., 2016, p. 34 emphasis added). Again, it is not clear why intuition is so bad for solar conduct given that for many of the households it seemed to be working, as collectively they were using between 40 and 98 per cent of the power they were generating. Surely, there is the potential that the 'intuition' was based on embodied know-how (Royston, 2014) as the households worked out how to benefit from their own generated electricity, even if it was to run "solar-powered gadgets" (Baborska-Narozny et al., 2016, p35). What is more, we do know that the "biggest beneficiaries of PV installations were those who consume more electricity and are at home during the day - homeworking" (Baborska-Narozny et al., 2016, p. 34). Given this, how would "systematic behaviour" (Ibid.) or in the Bahaj and James study an "energy message" (Bahaj and James, 2007, p. 2135), make a difference to those households that were not physically at home during the day?

The problems of relying on energy messages to shift or cut demand, was seen in a study of eight solar households in social housing (Garrett, 2014). Here a community development officer visited tenants in their homes and made suggestions such as boiling water during solar power production to store in a flask, as well as asking "why wait until it goes a little bit darker before starting to cook or use your washing machine?" He saw his job as influencing behaviours by encouraging people to "get into the frame of mind you can use it free of charge during the course of the day" (Garrett, 2014, p. 30). It appears that most of the household followed his advice for using washing machines during the day, but little else, which suggests that this was not about getting into the right mindset but more about how laundering was much more flexible as a domestic routine compared with others. This was one of the findings of the Durham study that explored energy demand and flexibility in thousands of households, including those with solar power (Bulkeley et al., 2016). They found that laundering was one of the more flexible routines as it generally only required one person, and was not associated with a particular time of the day, compared with, for example cooking (Powells et al., 2014).

Again, as we have seen throughout this review of UK solar PV studies, the double-dividend and its relations with information and financial rewards are not straightforward. The visit by the community worker may well have influenced the households to use their solar power for laundering, but it did not

work for cooking as this routine was tied into a complex set of social relations. Thus finishing work for the day, undertaking school work, watching television programmes, and children's bath and bedtimes are all potential influences on when cooking and eating take place, rather than simply a focus on changing one's mindset (Garrett, 2014). The Abi-Ghanem and Haggett (2011) study highlighted that even when households were given energy monitors, they were used to understand their daily practices in relation to solar energy production and consumption, rather than being a driver of behavioural change:

> In most cases, the residents had 'by chance' looked at the monitor owing to its location in the house, and as a result were able to conceptualise how much energy they consumed at different times of the day, suggesting the influence of everyday social practices on engaging with the technology… (Abi-Ghanem and Haggett, 2011, p. 157).

Finally, a UK 2004 study of social housing tenants by Ozaki and Shaw (2014) has some interesting insights to offer here, although unlike the other studies drawn on here, it focused on solar water heating rather than solar PV. They too found a behavioural model based on "cost-incentive and standardised advice" did not bring the results they hoped for (Ozaki and Shaw, 2014, p. 603). Instead the authors argue that energy demand is "shaped by people's attempts to juggle everyday routines and wider socio-cultural praxis, rather than driven by sustainable technologies alone, as policy makers and housing providers imagine" (Ozaki and Shaw, 2014, p. 602). Their conclusion reflects similar findings in the solar studies of Abi-Ghanem and Haggett (2011); Bulkeley et al. (2016); Ellsworth-Krebs and Reid (2016) and Powells et al. (2014).

2.3 Implications

What do we learn from these studies of microgeneration in terms of producing and consuming of solar electricity? Maybe one lesson is that it is far too simplistic to conclusively link microgeneration with a "double dividend" (Keirstead, 2005, p. 1249). We have seen evidence that financial rewards and information encourage some households to undertake load shifting, but also where they have not - even those who could potentially emerge as sustainability losers in the future. The overall message to be drawn from these studies is that if we are to understand how solar power is used in the home we need to go "beyond behaviour change" (Strengers and Maller, 2014, p. 1). We need to explore how producing and consuming -'prosuming' - solar power is woven into daily routines - social practices - and use this as a starting point by which to understand all the other influences, including money and information. This is why I now turn to explore how an understanding of Social Practice Theory can help with this, and in Chapter 3 I explore the implications of this for prosuming.

3 SOCIAL PRACTICE THEORY

In 2001 Schatzki et al., wrote about the 'practice turn'. In other words a " 'turn' away from individualist and structuralist approaches to focus on 'social practices ordered across space and time'..." (Hui and Spurling, 2013, p. 1). However, despite this, there is not one cohesive theory but a collection of concepts, theories and scholarly writing that takes a "practice approach" (Postill, 2010). While there is no one theory, this thesis will still refer to 'Social Practice Theory' or SPT as this term is widely used in the literature, as well as other relevant descriptions such as a 'practices'.

3.1 A brief history

Arguably it was some of the leading 20th century theorists including Bourdieu 1977, Foucault 1979, Giddens 1979, 1984 and de Certeau 1984, that undertook the groundwork and paved the way for the adoption of a practice approach that takes the everyday as central to their analysis (cited in Postill, 2010). Posthill names them the "first generation" practice scholars and highlights how they were seeking a "middle path between the excesses of methodological individualism - explaining social phenomena as a result of individual actions - and those of its logical opposite, methodological holism - the explanation of phenomena by means of structures of social wholes" (2010, p. 6). Instead the "theorists regarded the human body as the nexus of people's practical engagements with the world" (Postill, 2010, p. 7). To revisit the works of such theorists is beyond the scope of this thesis, although there are many excellent papers that draw on this literature (e.g. Warde, 2005). However, it was the "second generation" such as Reckwitz, Schatzki and Warde, who were key to further developing the idea of the human body as an instrument for delivering routine practices and in so doing helping to start the process of tying down the constituent parts of a social practice (Postill, 2010, p. 6).

Warde (2014) argues that we are now in a third phase that involves applying practice ideas to diverse empirical settings. He argues that in this period scholars have generally been less concerned with theoretical developments than "considering how various themes arising from the heterogeneous sources of the first two phases of theoretical development might be employed to address problems of description, interpretation and explanation of social processes and behaviour in a particular domain" (Warde, 2014, p. 285). The work of Shove and colleagues have spanned the last two phases contributing not only to theory development, but also numerous empirical applications including the seminal paper on Nordic walking (Shove and Pantzar, 2005). In addition, scholars continue to stretch and challenge an SPT approach, including papers coming out of the DEMAND centre that have been at the forefront of evolving a practice approach (e.g. Blue et al., 2014; Hui, 2014).

3.2 A focus on the everyday

While practice theory has been applied to many different fields including cultural studies, anthropology and ecological economics, it is the study of domestic and leisure practices that is most relevant to this thesis (Postill, 2010). Domestic studies have been diverse, including, for example eating practices (Warde, 2013), cooking practices (Halkier, 2009) and hair care practices (Hielscher, 2016). Alongside these are a range of studies examining leisure pursuits such as cycling (Watson, 2013), yoga (Hui, 2013), floorball and digital cameras(Shove and Pantzar, 2007). Their empirical settings may be very different, but the studies coalesce around a focus on everyday life and the importance of studying the routine, habitual and mundane and in the process invariably revealing demand for resources such as energy and water (Warde, 2014).

Despite a plethora of empirical studies, Social Practice Theory is "still difficult to digest upon first encounter" (Hui, 2014, p. 7). Like many theories it has its own language. For example, people are 'practitioners', in other words, 'carriers' of social practices that include domestic routines such as washing or cooking. And yet, even though the language may be opaque, social practices should intuitively make sense to people as they are part of the fabric of their everyday lives. Every working day millions of people get up, have breakfast, drive or walk their children to school and go on to work. At the end of the day they come home, cook, wash up, watch television and go to sleep (Røpke, 2009, p. 2490). Of course there are countless variations on this: for those people who are unemployed or retired their day would look very different but, even then, they may well still coalesce around particular daily routines and times such as cooking and eating dinner. In other words, people "if asked about their everyday life...will usually describe the practices they are engaged in" (Røpke, 2009, p. 2490). To understand how social practices can be applied to empirical studies, it is important to first have an understanding of two key concepts: practitioners and elements.

3.2.1 Practitioners

A **practitioner** is a core SPT concept, but what lies behind this term? In essence, it is used to highlight the role an individual plays in carrying out, '**performing',** a wide range of social practices in their daily lives; from playing football to doing the laundry; cooking a meal to driving to work. A '**performance'** requires a body to enact it and this has featured consistently in the evolution of a practice approach (Postill, 2010, p. 7). Importantly the body is viewed holistically covering both physical and mental dimensions in order to deliver a performance (Reckwitz, 2002). Thus, the performance involved in the delivery of laundering as a social practice can, for example, involve emptying the laundry basket, loading the washing machine, putting in the powder and pulling out the clothes at the end of the cycle. Sitting alongside these physical demands is a whole host of mental abilities including working out

whether the drum is big enough for a particular load, deciding on the best wash cycle for a grass covered football shirt, or the appropriate temperature for a woollen cardigan.

3.2.2 Elements

The "bodily-mental" activities by the practitioner are essential to the reproduction of a social practice, but they also need the 'elements'(Christensen and Røpke, 2005, p. 3). In a much quoted definition, Reckwitz describes a practice as a "routinised type of behaviour which consists of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge" (2002, pp. 249–250). However, Reckwitz is not the only scholar to define the elements of a social practice. As Table 1 highlights below, there is a wide spectrum of approaches, although there is also considerable overlap between definitions. For example, the material element is clearly present in all four definitions: "things" (Reckwitz, 2002, p. 245); "products" (Shove and Pantzar, 2005, p. 57); "items of consumption" (Warde, 2005, p. 137); "material configurations" (Schatzki, 2005, p. 12) and "objects, tool and infrastructures" (Spurling et al., 2013a, p. 5). And yet despite this consensus, the material element did not explicitly feature in Giddens or Bourdieu's work which were seen as fundamentally social theories (Shove and Pantzar, 2005).

Table 1 -Key elements that constitute social practices
Adapted from Gram-Hanssen (2011, p. 64); additionally drawing on Shove et al., (2012) and Spurling et al., (2013a)

'Three elements' model Shove et al. (2012)	Spurling et al. (2013a)	Shove and Pantzar (2005)	Warde (2005)	Schatzki (2002)	Reckwitz (2002)
Competence	Knowledge, skills, procedures and rules	Competence	Understandings Procedures	Practical understandings General understandings	Body Mind The agent Structure/process
Meanings	Cultural conventions and socially shared meanings, expectations, motivation and gains	Images/Meanings	Engagement	Teleo-affective structures	Knowledge Discourse/language
Materials	Objects, tools & infrastructures	Products	Items of consumption	Material configurations	Things

Arguably, it was Shove and Pantzar's (2005) drawing on science and technology literature that progressed the idea of understanding "things and materials in everyday life" (Shove et al., 2012, p. 9). In particular, their work on the development of Nordic walking highlighted how material elements co-evolved with skills and meanings to produce a completely new sport and practice based around "walking with sticks" (Shove and Pantzar, 2005, p. 47). This study of Nordic walking concluded that "the emergence and demise of practices have to do with forging and failing links between materials, images and skills i.e. the ingredients of any one practice" (Shove and Pantzar, 2005, p. 49). This study was the foundation stone for Shove et al's much cited " 'three elements' model": materials, meanings and competence, as highlighted in Table 1 above (2015, p. 278).

Returning to laundering, a practitioner invariably draws on a washing machine (material), knowledge to operate it (competence) and an understanding of why washing is undertaken (meaning). In rural India laundering may look very different. For example, instead of a using a washing machine a person may use the flow of a river and their own muscle power. And yet, it is highly likely that an observer would still be able to recognise it the social practice of laundering, because there are common elements such as water, detergents or meanings of cleanliness (Sustainable Practices Research Group, 2013).

3.3 A social construct

In the last section, we saw how practitioners and elements are intimately connected in their relationship to practices. This in turn leads to a performance in a particular place and time by a single practitioner. But this on its own does not constitute a social practice, which by definition needs to be socially recognisable, not an activity carried out sporadically by small groups of individuals. If instead there are countless performances of an activity which are broadly similar, across time and space, an **'entity'** emerges - such as laundering. Reckwitz describes an entity as a "block" or a "pattern" which is "filled out" by countless individual practitioners through their performances of a practice (2002, p. 250). This is summarised by the Social Practices Research Group as:

> "the social organisation of shared practices involves various elements. These make blocks of activities recognisable as practices, even to those people who do not necessarily perform those practices" (Sustainable Practices Research Group, 2013, p. 1).

Shove et al differentiate between **"practice-as-performance"** and **"practice-as-entity"** and illustrate the differences through the social practice of skateboarding (2012, pp. 7–8). The former is an integration of the elements by the practitioner into an individual performance. This may include the length of the board (material), the embodied knowledge needed to ride over a kerb (competence) and that skateboarding is a cool sport associated with teenagers (meanings). The latter, meanwhile, is the

recognisable sport of skateboarding, "an entity which can be spoken about and more importantly drawn upon as a set of resources when doing skateboarding" (Shove et al., 2012, p. 7). Although Shove et al (2012) add that skateboarding only exists as an entity because of repeated performances.

Practices are social constructs in so far as they exist because they are generally performed by large numbers of people across time and space. It might be because they take place at a similar time, for example eating an evening meal, or that such practices are undertaken in similar ways, such as doing the laundering. Either way, what is important is that it is through "shared social practices that patterns and trajectories of consumption are formed and rendered meaningful and, as a consequence, are faithfully and routinely reproduced by people in their day to day lives" (Sustainable Practices Research Group, 2013, p. 1). Practices are also socially constructed because of shared elements that migrate and can therefore be shared amongst any number of different practices. For example, commuting to work involves material infrastructures such as roads, cycle paths and trains, which are shared by many other practices from leisure activities to shopping (Spurling et al., 2013b).

Individuals who are practitioners are also 'carriers' of the social practice. By positioning individuals as carriers, SPT firmly places attributes such as knowledge, meanings and understanding with the practice and not the person (Reckwitz, 2002, p. 249). Again returning to skateboarding "the significance, purpose and skills of skateboarding are not simply contained within the heads of bodies of skateboarders: rather these features constitute the practice of skateboarding, of which the rider is merely a carrier" (Shove et al., 2012, p. 8). Additionally, the theory views the mind and body of practitioners, along with the elements, as embedded within the social practice itself rather than the individual (Christensen and Røpke, 2005) as highlighted by Reckwitz:

> "Practices are routinised bodily activities; as interconnected complexes of behavioural acts they are movements of the body...when we learn a practice, we learn to be bodies in a certain way...The body is thus not a mere 'instrument' which 'the agent' must 'use' in order to 'act', but the routinised actions are themselves bodily performances (Reckwitz, 2002, p. 251).

Shove acknowledges these concepts are challenging given the received wisdom that "behaviours are driven by beliefs and values' rather than social practices (Shove et al., 2012, p. 2). However, as we see below, Social Practice Theory confronts this prevailing paradigm.

4 A RECURSIVE RELATIONSHIP

4.1 Practice-as-entity - shining a light on 'normality'

As Warde has highlighted, we are currently in the third phase of the development of SPT as a scholarly endeavour, which includes applying its concepts to an array of empirical studies, with a particular interest in recent years on energy demand and social practices. By focusing on practice-as-entities, rather than behaviours of individuals, it is possible to start to explain how day-to-day life has been transformed over time. The example of showering and bathing illustrates this.

In only a few decades, the nation has transformed how it keeps itself clean. The daily wash with a flannel has given way to daily showering; but this is more than simply changing behaviours (Pulling et al 2013). The reasons for such a shift in cleanliness are multiple, but include a combination of technological and infrastructural changes such as power showers and bathroom plumbing, alongside "emerging commercial agendas linked to soap, cleanliness and freshness" (Pullinger et al., 2013, p. 3). As Pullinger et al write, daily showering has become the 'new normal' (Ibid.). At the same time the meaning of having a bath has changed from a focus on cleanliness to relaxation (Pullinger et al., 2013).

By exploring a historic trajectory of a practice-as-entity, it is possible to reveal changing elements over time with important implications for current and future resource use and sustainability (Walker, 2013). For example, a study by Unilever found that 21st century showering practices can use almost as much water and energy as a bath, and for power showers considerably more ("UK sustainable shower study," 2011). As Shove writes, all too often the "shifting sands of 'normality' " are often neglected by policy makers, as it is arguably easier to flag up behaviours rather than tackle the much harder issue of changing elements (Shove, 2003a, p 12). For example, is relatively easy to urge people to shower more often, than question why we are now washing ourselves more often than 40 years ago. As Shove points out, many environmental policies are unlikely to change behaviour as they do "little to challenge or stem the standardisation and globalisation of resource intensive ways of life" (2003b, p. 3). If policy-makers want to understand just what is 'normal' in daily life, how this has changed and the implications for resource use both today and in the future, they need to explore social practices and not simply examine behaviours (Shove, 2003b).

4.2 Practice-as-performance: shining a light on variations

As we have seen by looking at practice-as-entity, we can explore trajectories of practices and understand how their histories have important resource implications, not only for today but also for

the future. However, a focus on practice-as-performance can reveal variations in how different individuals perform practices and in turn have implications for the future development of a practice-as-entity. As Warde highlights in his seminal paper, while practices have a "trajectory, path of development, a history" these are far from uniform (Warde, 2005, p. 140). He writes, "such history will be differentiated, for the substantive forms that practices take will always be conditional upon the institutional arrangements characteristic of time, space and social context, for example household organisation, dominant modes of economic exchange and cultural traditions" (Warde, 2005, pp. 139-140). For Warde, diversity is integral to social practices as, through practices-as-performances, they "...contain the **seeds of constant change"** (2005, p. 141, emphasis added).

To return to the example of an upward trend in showering practices, there are groups in society where this is not the 'new normal'. One report highlighted how faced with water meters, low income families taking part in a study, had to adapt and improvise their day to day routines because of the cost of water. Thus to save money they undertook a range of measures such as "sharing baths, taking fewer baths and showers, washing clothes less often and not flushing the toilet every time it was used" (The Chartered Institute of Environmental Health, 2008, p. 3). The story of shared baths is a very different narrative from the mainstream "normality" of daily showers.

4.3 Two sides of a coin

Practices-as entities and practices-as-performance both have important stories to tell in understanding the evolution of a social practice - they are just different. Southerton highlights their recursive relationship: "practices configure performances, and practices are reproduced, and stabilised, adapted and innovated through performances" (Southerton, 2003, p. 339). While Spurling and Blue write:

> At the end of the day, to intervene in performance is to intervene in entity and vice versa, as although these ideas can be analytically separated, they remain, and should be considered as, fundamentally connected and mutually configuring (Spurling and Blue, 2014, p. 7).

And yet despite the analytical values of both practice-as-entity and practice-as-performance, this is not reflected in the literature - with an emphasis on the former rather than the latter (Gram-Hanssen, 2014; Greene and Westerhoff, 2014; Hitchings, 2013; Walker, 2015, 2013). As Hitchings states, while there are benefits in focusing on "broader sweeps of change" this has meant "that less attention has so far been paid to variation in how practices are concurrently reproduced" (2013, p. 104). Walker also argues that in the empirical translation of SPT, what often emerges is a focus on trajectories of social practices, at the expense of understanding differences in how practices are performed:

> Much of the work to date has been concerned with explaining broad arcs of change and analysing historical trends in the composition, character and resource intensity of the practices of which daily life is made. These narratives are at times over generalised, capturing processes of change but paying less attention to instances in which practices remain fixed and locked-in, or in which different paths are followed (Walker, 2013, p. 183).

Gram-Hanssen (2014) argues by distancing social practice studies from behavioural approaches, there has been a tendency to neglect how performances vary between practitioners, as well as the diverse settings in which they are performed. Greene and Rau have also written about how "most existing longitudinal practice research focuses on larger-scale processes to trace shifts in prevailing norms, technologies and at an aggregate societal level" (2016, p. 9). Writing in 2013 Walker argued that it was "hard to find examples of research that is inspired by theories of social practice…that directly engages with the reproduction of social inequality and injustice" (p. 181). Two years later he was still highlighting similar concerns that "little attention has been paid to matters of inequality" and how "individuals or social groups are being included or excluded from practice performance" (Walker, 2015, p. 50). If we are serious about addressing issues of sustainability 'winners and losers' as highlighted in the introduction, Walker argues that we must turn to examining performances which is the focus of the next chapter (2013, p. 182).

5 CONCLUDING SUMMARY

Given the small amount of literature devoted directly to producing and consuming solar power, this chapter instead turned to UK studies exploring microgeneration. In many cases the activity of prosuming underpinned the work although often framed in terms of 'load shifting' – the simultaneous generation and consumption of solar power. The overarching theme that emerged was the hope that microgeneration could achieve a 'double dividend' - not only producing renewable energy but also changing energy behaviours, such as shifting or cutting consumption. And yet what became apparent from the studies was a much more complex picture. While information and financial rewards had a part to play in influencing behaviours, this was far from consistent. Instead, what was significant was the importance of understanding the context in which solar power was being produced and consumed, and how it fitted within the social practices of households rather than particular behaviours.

The rest of the chapter was devoted to exploring Social Practice Theory and its key concepts. As an analytical tool, practice-as-entity offers an opportunity to go 'beyond behaviour change', to understanding the underlying social patterns that shape a practice. By highlighting the importance of understanding what are 'normal' domestic practices and how these trajectories have shifted in recent years, we see how demand for resources has intensified, as highlighted by showering and bathing.

However, practice-as-performances is also an important analytical concept as it offers the opportunity to probe beneath the overarching trajectory to discover the many and varied performances and practitioners that make up an entity. And yet despite its value, practice-as-entity rather than practice-as-performance has dominated social practice research, and consequently there are a lack of studies exploring issues of inequality and how certain social groups are included or excluded from performing particular practices. The challenge for the next chapter it to develop a framework that moves beyond framing prosuming in behavioural terms, but does not lose sight of individuals as practitioners. To do this, the framework takes the concept of practice-as-performances and draws on the Time Geography ideas of projects and pathways to develop the Prosuming Project.

CHAPTER 3

CONCEPTUAL FRAMEWORK: PATHWAYS FOR PROJECT PRACTITIONERS

1 INTRODUCTION

The **last chapter** explored how the concept of Social Practice Theory could open up new dimensions in examining producing and consuming - prosuming - solar energy. It highlighted, through the example of showering and bathing, the analytical power of practice-as-entity revealing trajectories of 'normality' and the importance implications for resources. It also highlighted that the other side of the coin - practice-as-performance - offers important insights into diversity of practitioners and their performances. However, social practice studies have tended to emphasise the former rather than the later, despite the recursive relationship between the two.

This chapter takes up the challenge of redressing the balance towards practice-as-performance by developing a conceptual framework that foregrounds practitioners and their performances. At the same time, it seeks to avoid falling into a trap of focusing on individual behaviours rather than the underlying social organisation of life through shared practices. It does this by using Social Practice Theory to develop a three part conceptual framework that focuses on performances but also adds in ideas from Time Geography. In particular, it explores the role of a project practitioner and their need to mobilise elements, as well as orchestrate social practices to the fulfilment of projects. The chapter makes the case for framing prosuming as a project rather than a social practice.

In more detail:

Section 2, argues for the importance of understanding the individual behind the social practice concept of a 'carrier' of practices. A number of scholars assert that the notion of a carrier is too static and ignores the dynamic relationship between individuals and social practices.

Section 3 uses Social Practice Theory, with an understanding of projects and pathways from Time Geography, to explore how to prioritise people without losing sight of the underlying social organisation of practices. Projects are made up of both practices and elements. A project-practitioner

actively mobilises elements and orchestrates social practices to the fulfilment of a project. The section also highlights that not all projects are equal - 'dominant', institutional projects often take precedence over 'secondary', voluntary projects.

Section 4, explores whether prosuming is a project or not. Given the lack of literature exploring prosuming of solar power, a study of off-grid households in Canada is drawn upon. The study offers insights into how 'off-gridders' both integrated elements as well as orchestrated numerous social practices for what was, in effect, their Prosuming Project.

Section 5 argues for developing a conceptual framework based on different pathways for project-practitioners. It then draws on various literatures to suggest a three-part framework: adopting, establishing and committing to a project. The argument is made that such a framework offers an opportunity to focus on the journeys of individual practitioners and makes transparent the different pathways that may be open to them, in the development of a project.

Section 6 concludes the chapter.

2 REVEALING THE INDIVIDUAL BEHIND THE CARRIER

The last chapter highlighted the need to redress the balance in favour of more empirical studies focusing on practice-as-performances. But in order to do this we need first to address the issue of the social practice concept of the 'carrier'. As Reckwitz writes, "The single individual - as a bodily and mental agent - then acts as the 'carrier'...of a practice" (2002, pp. 249–250). The notion of a carrier, goes to the core of Social Practice Theory which focuses on practices rather than people as the unit of analysis, resulting in a "radical departure from more conventional approaches in which understandings, know-how, meanings and purposes are taken to be personal attributes" (Shove et al., 2012, p. 7).

However, a number of scholars have raised issues with the term carrier. For example, Sayer sees it as representing individuals as "passive, ignoring their dynamic, normative or evaluative relation to practices" (2013, p. 170). In addition, he describes how the concept of carriers offers merely a " 'spectators' view" that can result in a "third person account of practices in which characteristic events recur and relations are reproduced in a predictable fashion, when to the participants, what will happen is uncertain and a matter of concern" (Sayer, 2013, p. 170). Although Social Practice Theory underpins the work of Hui and Spurling (2013), both still argue that the notion of a carrier is too static a concept and ignores the dynamic relationship that develops between individuals and practices

over time. Greene and Westerhoff too states that "existing practice investigations, while emphasising the dynamic nature of practices, have paid less attention to individual lives and in doing so have often implicitly posted the individual as a static carrier of elements"(2014, p. 29).

Instead, increasingly a number of SPT scholars argue that "in 'shifting' the 'unit of analysis' to social practices we should not lose sight of individual lives" (Hui and Spurling, 2013, p. 1).That is not to detract from the significant contribution that SPT has made to develop "sets of concepts that allow components or characteristics to be articulated and investigated in specific empirical cases" (Hui, 2014, p. 2). However, to address issues of variation in practices and inequalities in who is recruited as a practitioner, arguably more needs to be done. One way to do this is to include a focus on the lived experiences of individuals and their relationship with social practices (Greene and Westerhoff, 2014; Hards, 2011). This is explored in the next chapter as part of the rationale for developing a case study, but here I want to first address this gap by developing a theoretical framework that both foregrounds the individual behind the carrier and their performances, but also remains committed to the core idea that practices are inherently social, not simply individual behaviours. Additionally, such a framework needs to recognise that individuals are never guaranteed to be "faithful or reliable servants" (Shove et al., 2012, p. 126) and that they "sometimes contest, the standards and norms of practices" (Sayer, 2013, p. 171).

However, rather than looking solely to Social Practice Theory to address these issues, I have, like a number of SPT scholars (e.g. Hards, 2011; Røpke, 2009; Shove et al., 2012; Spurling, 2010, 2009, Watson and Shove, 2008) turned to Hagerstrand (1982) and Pred's (e.g. 1981a, 1981b) concept of 'Time Geography'. Pred describes Time Geography as addressing "…the time-space choreography of the individual's existence at daily, yearly or lifetime (biographical) scales of observation" and in particular the role of institutional projects that puncture a series of pathways undertaken by individuals across time" (1977, p. 208). However, despite this interest, Time Geography still appears to be a relatively under-utilised body of work within social practice scholarship.

3 SOCIAL PRACTICE THEORY THROUGH A TIME GEOGRAPHY LENS

3.1 A project defined as a meta-practice

Pred defines a project as "the entire series of simple or complex tasks necessary to the completion of any intention-inspired or goal-oriented behaviour" (1981b. p. 4). Back in his 2005 seminal paper, Warde wrote of the significance of "purposive projects" to everyday life and how they are realised by

"routine purposive tasks" (2005, p. 147). Christensen and Røpke takes the concept and frame it using Social Practice Theory:

> A project is a series of activities, or in the terms of practice theory, a complex of practices necessary to complete an intention, and it can be defined either by individuals or within an institutional context. It may be seen as a sort of **meta-practice** to which several 'sub-practices' relate. (Røpke and Christensen, 2012. p.351).

But how do we know if something is a project? Christensen and Røpke discuss how it can be helpful in defining a social practice to see if it "makes sense" to people (2005, p. 8). Given that a project is a "meta-practice" then logically 'making sense' should also apply to them (Røpke and Christensen, 2012. p.351). What is more, the evidence is all around us that this is the case - from learning to cook to building a shed - projects make sense to people. Watson and Shove's (2008) 'Do-it-Yourself' - DIY - study found that their research participants were familiar with the notion of a project and applied it to a range of scales thus "putting up a shelf counted as a project and so did knocking down a wall", as did the entire renovation of a house (2008b, p. 81). Pred also highlights that projects can be both repetitive - part of a routine - as well as being undertaken just the once (1981a). While projects may come in many different shapes, sizes and complexity, they are all made up of "activity bundles" (Pred, 1977, p. 209) - in other words social practices - that generally have a logic to them that require a particular order of delivery and result in an "observable outcome" (Watson and Shove, 2008, p. 81). As Pred highlights: "the preparation of a meal, the organization of a wedding, and the manufacture of a good all, like any other project, require that certain tasks be performed before others" (1981, p. 10).

3.2 Project-practitioners - mobilisation of elements & orchestration of practices[1]

We can describe a project, but what constitutes it? Given its status as a "meta-practice" (Røpke and Christensen, 2012. p.351) it should follow that it too is made up of elements - materials, meanings and competences. As we saw in the last chapter practitioners need to integrate elements for a social practice performance and, I would argue, this is also the case for the performance of a project. For example, using Pred's example of a 'Wedding Project' (1981a) the following elements could be integrated into a performance:

- Meaning - a legal ceremony where two people commit to spend their lives together

[1] I am indebted to Shove and colleagues for the terms 'mobilising' (Shove et al., 2012), as well as 'orchestrating' (Shove et al., 2008; Watson and Shove, 2008). They have been instrumental in helping to build a conceptual framework for the evolution of a project. Given that this is the first time I have thoroughly explained the concepts, I have given the full citation so the reader can look up the reference if they wish. However, as the terms are used so much throughout the thesis I have decided, on balance, that if I kept repeating the citations it risks disrupting the flow for the reader. In all cases the term builds on from the work of the original authors.

- Material - a hotel where the ceremony take places
- Competence - public speaking for an after dinner speech

And yet first practitioners have to be able to access the elements, in other words "mobilising (or not mobilising)" them into a performance (Shove et al., 2012, p. 78). However, to deliver a project practitioners also need to deploy social practices:

> In everyday life, projects, which take many forms, are significant devices deployed in bounding and in making sense of the temporal flow, and actively **orchestrating** and interweaving complexes of practices (Shove et al., 2008, p 144 emphasis added).

Thus, returning to the Wedding Project, the orchestrating of social practices to its fulfilment might include cooking to provide an evening buffet or dressmaking for the special outfits. A project practitioner challenges the concept of a static carrier of practices (Hui and Spurling, 2013). As Watson and Shove highlight, projects "have a rather different status. For one thing, they are more obviously 'made' by human actors who weave multiple practices together…" (2008, p. 81). Individuals can be both carriers of practices but also active project-practitioners who are "orchestrating forces, condensing diverse resources and energies around specific goals" (Ibid). There is nothing passive (Sayer, 2013) about project-practitioners. While Pink and Leder Mackley do not use this term, arguably their 'directors of flows' has a similar role:

> …if we place human subjects at the centre, and lend them some agency, we can also see people at the **directors of flows**, with some intentionality and some power to enable, navigate and curtail some flows, or at least attempt to do so…From this perspective people are not just 'carriers' of practices...but instead they also modify practices both through individual agency and in relation to the processuality of the flows in relation to which she or he engages in practical activity (Pink and Leder Mackley, 2015, p. 169 emphasis added).

Thus project-practitioners direct 'the doing' of domestic everyday activities but also make time in their day to ensure the fulfilment of dominant and voluntary projects. As Watson and Shove highlight, projects involve practitioners briefly stepping outside the daily unfolding of practices:

> What counted as a project varied widely yet the notion was uniformly important as a way of structuring the otherwise boundless flow of daily life (Zerubavel, 1985). Time was set aside for projects, tools and materials were acquired or assembled with the project in mind...Used in these ways, the project stands somewhat outside the streams of practice and the momentary conjunctions of tools and skills that characterise the doing... (Watson and Shove, 2008, p. 81).

3.3 Dominant and secondary projects

Key to Hagerstrand (1982) and Pred's (1981; 1981a) Time Geographic concept, is that it is not just individuals who instigate projects but also institutions with important implications for daily life. As Røpke highlights:

> Institutional projects are the result of decisions made by those who hold power and authority within institutions, and the projects of dominant institutions in society tend to take time-allocation and scheduling precedence over other projects (Røpke, 2009, p. 2493).

As Pred highlights, such "dominant" institutional projects often compete with "other projects" from individuals (1981, p.p 15-16). I have termed these other individual projects, as 'secondary' compared with the dominant, institutional projects. I have also drawn on Shove et al's idea of voluntary participation in practices and applied it to secondary projects (2012). Dominant projects emanate from powerful institutions within society and are highly influential in shaping the lives of individuals (Pred, 1981). As Pred explains, they "require that participating individuals expend their labour power or in some other way engage with themselves in activity in a given manner, at a given time and place (1981, p. 16). While secondary, voluntary projects may well be important to an individual, they often face being squeezed out, or at least minimised by the dominant, institutional projects. This is highlighted in Pred's study of emerging 19th century American cities:

> Once individuals had committed their daily paths to the fixed temporal and spatial requirements of factory and large-scale shop production projects some very basic constraints arose on their ability to partake in home-based everyday projects essential both to the practical functioning of the family and the nurturing of personal relationships within the family (Pred, 1981b, p. 10).

As highlighted by Pred above, diverting energy and resources to particular projects and practices can mean others are neglected, given that an individual has finite time, as well as not being able to be in more than one place at a time. This is seen in the "daily paths" of individuals that are created from the flow of projects and practices unfolding over a day, as well as the "coupling and uncoupling" with other paths of individuals and institutions (1981, p. 9):

> The coupling of different paths are organised by projects that recruit participants.... it can be defined either by individuals or within an institutional context" (Røpke, 2009, p. 2493)

Returning to Pred's (1981b) study of 19th century American cities, artisans suddenly found their daily paths dominated by institutional projects resulting in less time for other important, but secondary, individual projects. This resulted in their artisan skills declining, simultaneously reinforcing dominant projects and shutting down potential pathways in the future:

> …institutions occupying positions of societal domination are those whose projects are dominant ...in the sense that the time resources they demand force some other projects to be

> pushed aside totally and obliterated along with any traditional skills and knowledge necessary for their performance (Pred, 1981b, p. 16).

As practices and projects unfold across time and space, it is not just the daily path that is shaped, but also an individual's biographical or "life path" (Pred, 1981b, p. 23). Shove et al write, "taking one path and not another configures opportunities for the future. Having children, changing occupations or moving to another country all have such effect" (2012, p. 78). But the concepts of practices and projects not only illustrate how paths unfold for individuals across a day or even a lifetime, critically, Pred (1981) argues, they also offer a way of linking this to the reproduction of dominant institutions and society. As dominant, institutional projects are performed across time and space, so they tighten their grip on daily and life paths:

> ...the details of social reproduction...are constantly spelled out by the intersection of particular individual paths with particular institutional projects occurring at specific temporal and spatial locations (Pred, 1981, p. 10).

Pred's (1981, 1981a, 1981b) concepts of projects and paths offers insights into how practices are deployed in daily life, as well as making links between individual paths and the influence of dominant institutions such as work, education, the economy and even the family itself (Shove et al., 2012, Spurling, 2009, 2010).

4 PROSUMING AS A PROJECT

This chapter has highlighted that there are many different projects in different domains of life emanating from individuals and institutions but is prosuming one of them? And if it is a project, is it emanating from an institution or an individual?

Firstly, we need to consider whether prosuming is in fact a social practice. Is 'doing prosuming' similar to 'doing the driving' 'doing the washing' or 'doing the cooking '; in other words a social practice that countless practitioners regularly perform across the world? The Social Practices Research Group argue that a social practice needs to be a recognisable entity "because sufficiently large numbers of people perform them either at the same time (eg rush hour commuting) or in broadly similar ways (eg the laundry)" (Spurling et al., 2013b, p. 1). However, as we saw in Chapter 1, while UK solar power generation has significantly increased in recent years, it is still only around three percent of total electricity generation in the country (BEIS, 2017b). Thus in this country, prosuming is still the exception rather than the norm, and would fail the Social Practices Research Group social practice benchmark of sufficient numbers of performances.

Additional to this, there is a question mark over whether any form of consumption can be a social practice, regardless of whether it is also linked with production. Warde argues that consumption is integral to most practices and is "not itself a practice but is, rather, a moment in almost every practice" (2005, p. 137). So if prosuming would struggle to be defined as a social practice what about as a project?

Given the lack of literature that directly explores prosuming, this is largely unchartered territory. However, there is one ethnographic study that can highlight the relationship between prosuming, practices and projects. Vannini and Taggart (2015) spent two years travelling across Canada meeting over 200 'off-gridders' - individuals who rely on producing and using their own renewable energy rather than drawing on external infrastructure. What the findings of the research highlight, is that off-gridders demonstrate the two key features of being a project-practitioner: integrating elements and orchestrating social practices to the fulfilment of a project. While the concept of prosumption is not used by Vannini and Taggart (2014), like the microgeneration studies in Chapter 2, it still underpins the research. On close examination the study reveals that Shove et al's (2015) three element conceptual social practice model (2015) can be applied to prosuming as illustrated by Don and Maxine; two Canadian off-gridders:

> Wood is notoriously temperamental, flaring up in bursts of tropical temperatures soon after lighting and causing indoor temps to plummet soon after the fire goes out. To discipline it - as good teachers like Don and Maxine used to be - they applied basic **scientific principles**. A collection of 5,300 gallons of water had been stacked in the crawl space in motley piles of carefully sealed containers of different shapes and sizes. The containers didn't come from the local hardwore store…they had been methodologically **scavenged** by Don and Maxine from schools, restaurants, hotels… Heated during winter by a **wood stove** and during autumn and spring by warm air fanned down the solar collector by their old Datsun car heater-blower, the water worked as a thermal mass. It absorbed and radiated heat slowly and thus reduced the need for additional wood burning and stabilised temperatures upstairs. It was only one of myriad inventions and ingenious applications we found in Don and Maxine's home that morning. (Vannini and Taggart, 2014, p. 45 emphasis added).

This paragraph demonstrates how the two practitioners mobilised **materials (e.g. wood stove)**, **meanings (e.g. scavenging**) and **competence (e.g. scientific principles**) into a highly accomplished project performance that resulted in both generating and consuming their own renewable energy. But this is only part of the story of being a prosuming project-practitioner. The second key feature is that such project-practitioners need to orchestrate social practices to the fulfilment of a project. Vannini and Taggart's book is full of tales of how prosuming project-practitioners adapted practices to take into account the rhythms of the day and changing seasons to make the most of solar or wind production. For example, using canning and drying techniques to preserve food to cut back on the need for large freezers, which make a heavy, on-going demand for

energy. A different case study of Ron and Johanna illustrate how as project-practitioners they orchestrate social practices, such as laundering, by adapting them for the Prosuming Project:

> Ron and Johanna lived in great synchronicity with the weather's seasonal and diurnal patterns because of the changing rhythms of light and heat. So a load of laundry might have had to wait for a sunny day, when batteries could be quickly recharged from the drain imposed by a washing machine, off-griders engaged in a unique form of slow living - investing their everyday life with a temporal attentiveness and care that challenged the relation between power and speed typical of modern life (Vannini and Taggart, 2014, p. 79).

So how does this brief foray into off-grid practitioners illuminate our discussion into prosuming as discussed in Chapter 2? Despite the obvious differences between prosuming in off-grid Canada compared with an on-grid social housing estate in the UK, there are certain project similarities. Firstly, in order to produce and consume solar power, practitioners in the UK also need to integrate three key elements: materials (e.g. solar panels), meanings (e.g. 'free' electricity) and competences (e.g. understand how to utilise the solar power). Secondly, they also need to be able to orchestrate practices for the fulfilment of the project. For example, adapting laundering as a social practice to coincide with solar production. Similar to recognising the social practice of laundering whether in India or Ireland, the same is true for the Prosuming Project - it may look different in the Canadian wilderness but, like the off-gridders, UK practitioners still need to integrate elements and orchestrate practices to its fulfilment.

In terms of whether prosuming is a dominant, institutional project or secondary, voluntary project Pred throws some light on this (1981b). He asserts that projects originated by individuals often have some flexibility attached to them, which is absent from institutional projects and suggestions. What is striking about the stories from Vannini and Taggart' s (2014) book is the active choice that the households make in becoming project-practitioners and how this is often aligned to stepping back from the more rigid demands of institutional projects. Thus "self-sufficiency promised them a sense of freedom and independence, and its daily practice yielded a re-affirming sense of self-reliance, self-confidence and self-efficacy" (Vannini and Taggart, 2014, p. 167). Arguably, the Prosuming Project is a voluntary project emanating from individuals and hence carrying a secondary rather than dominant status. Individuals can choose whether to perform the project, whether they are in the wilds of Canada or on a social housing estate. The next section now returns to the task of building a social practice theoretical framework that draws on the Time Geography concepts of projects and paths.

5 PROJECT-AS-PERFORMANCES - PRACTITIONERS, PRACTICES & PATHWAYS

Social practice theorists argue that "understanding transitions in socio-technical systems depends on paying attention to the trajectories of practices that are themselves active constituents of those

systems" (Watson, 2013, p. 122) . But as we have seen earlier, there are concerns that such trajectories, as illuminating as they are for examining changing resource patterns and the rise and fall of particular practices, can fail to detect underlying differences in performances (e.g. Hitchings, 2013; Walker, 2013).

> By concentrating on the emergence and disappearance of practices, accounts like these are at risk of downplaying the significance of diversity and difference. Focusing on broader sweeps of change is valuable in that it underlines the importance of collective arrangements, but such an emphasis also means that less attention has so far been paid to variation in how practices are concurrently reproduced (Hitchings, 2013, p. 105).

Walker too is concerned that a focus on a social practice trajectory offers insights into broad trends rather than the "different paths which are followed" by individuals or social groups (2013, p. 183). Pred, however, offers a more fluid interpretation of a trajectory. He writes that an "individual's existence can be diagrammatically described as a trajectory, a 'daily' or 'life-path' of movement - **a weaving dance** through time-space" (1977, p. 208 emphasis added). As individuals can only be in one place at a time, there is a constant need for negotiation and trade-offs between dominant projects, and secondary ones:

> Because the path concept stresses the physical indivisibility and finite time resources of the individual, it forces us to recognise that participation alternations in one realm of practice invariably bring participation adjustments or changes in other realms of practice - both for self and others (Pred, 1981a, p. 10).

There is limited literature to draw upon that explicitly explores the evolution of projects, practices and practitioners, however Shove et al (2012), Spurling (2009) Watson and Shove (2008) and Hui and Spurling (2013) have all offered inspiration. In particularly Hui and Spurling are interested in "the 'whole' intersection of an individual with a practice, that is, rather than framing individuals as performers in a moment, we conceptualise them as having a history and future of performances too" ((2013, p. 1). They have drawn on careers literature to explore notions of careers-in-a-practice, as have Hards (2011) and Greene and Rau (2016) who have combined this with methodologies such as narratives and biographies as a way of gathering lived experiences.

Drawing on this social practice literature, combined with concepts from Time Geography, I have developed a three part conceptual framework for examining project-practitioner pathways across the life of an individual project. In terms of Social Practice Theory, the conceptual framework in Figure 1 below, focuses on a project in terms of project-as-performance, rather than project-as-entity. That is, I am primarily interested in individual practitioners and their performances rather than understanding how a potential project-as-entity has evolved over time. Arguably, the project may not even be an entity if it is a relatively new project with limited uptake such as prosuming, but that does not stop us

exploring the individual performances as we saw in the Vannini and Taggart's off grid study (2014).

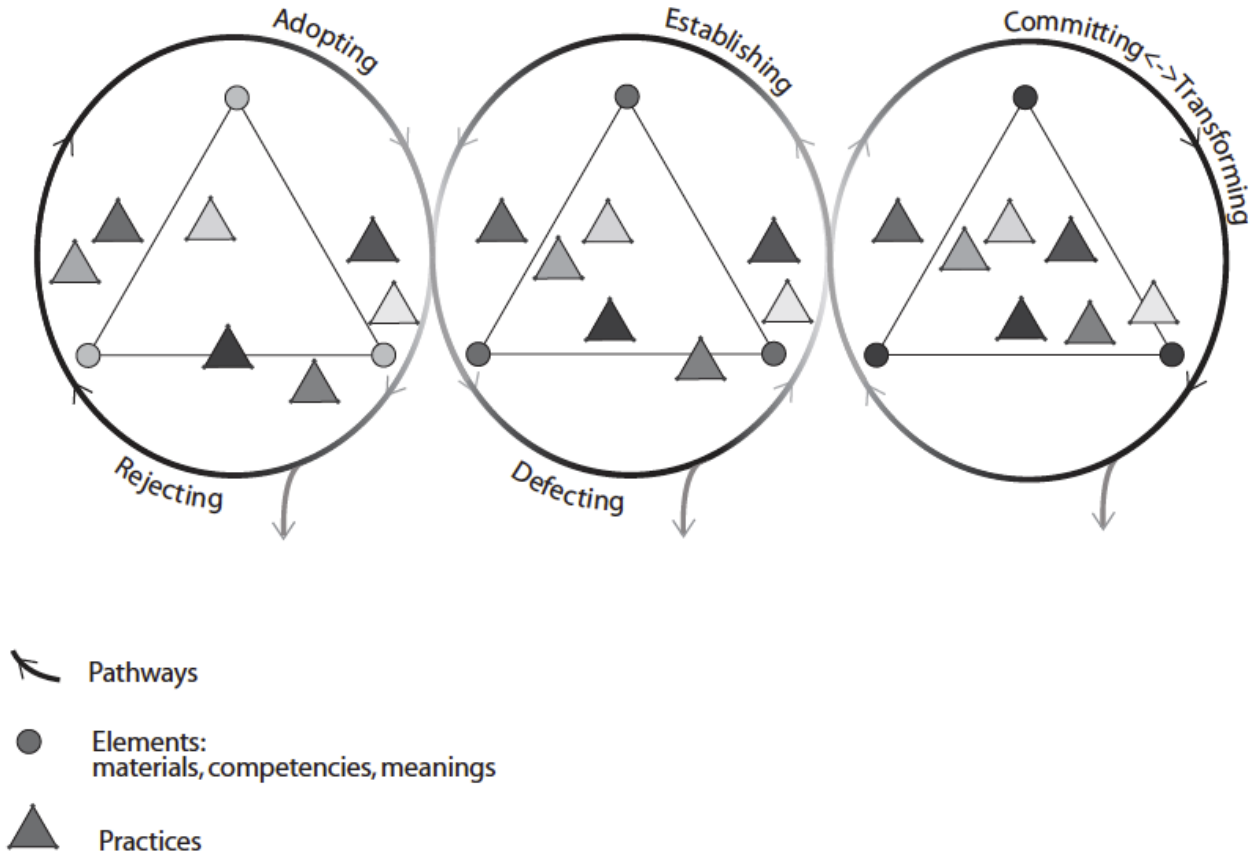
The conceptual framework explores both the mobilisation of elements by the practitioner as well as the orchestration of social practices. It also focuses on pathways rather than careers as the former offers fluidity - weaving through a life path - rather than a sense of climbing a career ladder (Pred, 1977). As in any journey, there can be breaks, stopovers or a change of circumstances that can result in an individual taking different pathways or none at all. The concept of a 'career' can also be used to denote different options including, stopping, reversing or pausing (Hui and Spurling, 2013), but despite this the concept still feels attached to a linear progression. As Shove et al write: "In the world of work, careers consist of recognized stages through which individuals pass as they climb the occupational ladder. Starting off as newcomers, their status changes each time they reach another rung" (2012, p. 70).

The first stage of the conceptual framework - **'Adopting'** examines whether an individual is able to take up a project, for example whether they are able to mobilise the necessary elements. This will be influenced by whether it is a dominant or secondary project, and if the latter, what it is competing against in trying to find time in a busy daily life path. The second stage '**Establishing'** explores attempts to embed the project into the daily life path by a practitioner, against a backdrop of potential defection. The third stage '**Committing'** examines what happens when an individual fully commits to a project and whether this process is transformative of both practitioner and project.

Figure 1

Project-Practitioner Pathways

Mobilisation of elements & orchestration of practices



Source: Own (inspired by Hagerstrand, 1982; Hui and Spurling, 2013; Pred, 1981, 1981a, 1981b; Shove et al., 2012; Watson and Shove, 2008)

5.1 Adopting the project

In the SPT literature, recruitment to a social practice is associated with 'first encounters' (Shove et al., 2012). For example, a first encounter of Nordic walking (Shove and Pantzar, 2005) may involve seeing it on television or going for a walk with a neighbour who is a practitioner. Alternatively, it may involve finding a pair of sticks in a car boot sale or looking online as to what to do with them. As this example suggests, to understand first encounters they needs to be explored empirically, as they will vary between practices and people. However, as Shove and Pantzar highlight, "first exposure carries with it the seeds of further development both for potential recruits and for the practice itself" (2007b, p. 164). For the seeds to be embedded, an individual needs to be able to mobilise the necessary elements and eventually integrate them into a practice performance.

Returning to the Nordic walking example (Shove and Pantzar, 2005) access to the elements needed for the leisure practice may be tricky for many people. For example, the sticks could be too expensive, or an individual may struggle to find a local training course or simply associate the sport with the countryside rather than the urban area they live in. Thus a practice can reject a practitioner because they are not able to mobilise the necessary elements or practices. But, like many leisure practices, Nordic walking is also not highly contentious, if someone did not have access to the elements they could potentially take up walking in their local park as a way of getting fit with no sticks or training needed. However, Walker (2013) argues that there are many other examples of practices that are much more contentious and, despite this, recruitment as a process is not given the full attention it deserves in many social practice studies.

> This process of recruitment is often presented in a rather unproblematic way, perhaps due to the use of empirical examples, including hobbies and leisure pursuits, in which participation is not especially normatively charged. However, there are many situations in which patterns of recruitment are differentiated and contentious (Walker, 2013, p. 187).

One such example are "warmth-related practices" such as "dressing, eating and drinking and opening and shutting doors and windows….together with those that are more explicitly and singularly warmth-related, such as operating a heating technology or putting another log on the fire" (Walker, 2013, p. 189). Those practitioners who can mobilise a heat pump as a material element may well find it easier to be recruited to a warmth-related practice than someone who only has access to an electric fan heater.

In terms of this conceptual framework, I would argue that 'warmth-related practices' could be analysed in terms of projects and pathways. By focusing in on a project, it is possible to shine a light on the ability of individuals to mobilise elements and orchestrate social practices to integrate into warmth-related performances. While Walker draws on Sen's capability work lens (1982, 1999, 2009 cited in Walker, 2013), which is beyond the scope of this research, the underlying issue is the same – a practitioner's ability to mobilise different elements into a performance:

> Any one practice is re-enacted through a series of variously skilled performances….This variation is not simply a consequence of the necessary process of learning…It also relates to the uneven distribution of capability, specifically the capability to successfully integrate the elements required for an effective performance of 'the practice'. Capability might relate to income (for example in order to access the necessary material element), but also…to one's state of health, or patterns of family structure and dependence (Walker, 2013, p. 187).

Although the social practices literature refers to recruitment, I prefer the term adoption with regard to projects. Recruitment implies a focus on social practices and whether or not they can recruit carriers.

This is consistent with SPT, which argues for practices and not people as the unit of analysis. However, as Walker has implied, it is possible to lose sight of individuals or even social groups who may be excluded from a practice. Instead, my conceptual framework shifts the focus onto individuals and whether or not they can adopt a project given their ability to mobilise, or not, elements, alongside orchestrating practices to the fulfilment of projects in their daily paths.

As Shove et al highlight, certain practices can "only be carried out by those that are fit and healthy, who are of teenage years, or who already have certain skills or wealth, recruited from already limited populations" (2013, p. 78). Again, the same is true for projects. Even if an individual can mobilise the necessary elements and orchestrate practices, they still may decide to reject a project, particularly if it is secondary rather than dominant, because of an already crowded daily path (Shove et al., 2012). However, as Figure 1 shows, at some points the individual will either have to reject the opportunity to become a project-practitioner, or move onto establishing the project.

5.2 Establishing the project

In the last section, we saw that adoption is not always a straightforward process. It is dependent on the ability of an individual to mobilise elements and orchestrate practices within daily paths to become a project-practitioner. However, at some point, the timing of which can only be answered empirically, an individual may end up on a path of starting to embed a project in their daily lives. But what does this involve?

Hui and Spurling (2013) highlight how through repeated performances individuals start to build up the expertise needed to become better at performing a practice. Thus progress in a practice can be linked to the "accumulation and use (or performance) of various types of knowledge and skills" (Hui and Spurling, 2013, p. 4). They have drawn on literature from the Chicago School of Sociology to explore the concept of a 'career'. Through a series of ethnographic studies spanning many decades, Chicago sociologists highlighted how careers can cover many domains of life including becoming a drug dealer, doctor or psychiatric patient (Hui and Spurling, 2013; Shove et al., 2012). For example, a study of 'taxi-dancers' - women who are paid to dance with a partner - highlighted that a career consisted of series of 'turning points' that are a "set of experiences and interpretations that led the dancer to either exit the career's trajectory or else move deeper into the dancehall worlds towards the life of a prostitute' (Barley, 1989, p. 44). This is reflected in Figure 1 as practitioners face the tension between establishing a project in their daily path, or exiting from it, in SPT words 'defecting'(Shove et al., 2012). That decision may be a choice but also could be forced upon a person, for example having to defect from a work related project because of injury. As Shove et al highlight for "individual

practitioners, defection and continued participation are often in tension" (2012, p. 71). By revealing such tensions, it makes issues of inclusion or exclusion, in terms of whether an individual can perform a project, more transparent. As Shove et al highlight, if an individual practitioner can no longer perform driving as a social practice, this may well have considerable impact on other practices, or arguably projects:

> …people who are socially-spatially excluded are those who are for whatever reason unable to participate in social groups, worlds and networks membership of which would for them, constitute 'normality'. In other words they are unable to accomplish those practices...required for social participation (Shove, 2002, pp. 1–2).

Yet there are also other constraints that can determine whether an individual starts to embrace a project through regular performances or start to consider defection. In particular, time - or lack of it - is critical. As discussed earlier, Pred (1981a) has highlighted the potential paths that individuals can take in daily life, and a key determining factor of this is the demands made by various projects and practices that an individual is connected with. For example, the shift worker will find their institutional work project influencing a number of practices such as cooking and eating with the family because of constraints on their time.

As discussed earlier not all projects are equal - dominant, institutional projects invariably trump secondary, voluntary projects. But also, of course, practitioners are also not equal in terms of the power they can command over their day. As Shove highlights "those who have the power, resources and the capacity to exploit the latest technologies of speed and flexibility are potentially able to 'create' time for value purposes" (2002, p. 7). Arguably, those who 'have the power' also have more choice over which dominant projects they expend "their labour power or in some other way engage themselves in an activity in a given manner, at a given time and place...dominant projects therefore place certain individuals and groups of individuals in a subservient, or dependent, and conflict laden relationship with those other power-wielding individuals and groups who define the projects in question..." (Pred, 1981a, p. 16).

Becoming a practitioner is not simply about just adopting a project. It also depends on the ability of practitioners to continue to mobilise the elements and orchestrate the practices within their daily and life paths. In terms of a social practice Shove et al write "its ability to capture and retain recruits and prevent them from defecting depends on its positioning in a sea of other practices, each with relatively volatile, relatively static trajectories of their own" (2012, p. 77). The same is true for projects but with a focus on the practitioner who has to weigh up the merits of each one, particularly if they are voluntary and of secondary importance, compared with those emanating from institutions. During the establishing phase, this tension between performing and defecting is particularly acute as projects are

not deeply embedded into daily or life paths. This period could, however, carry on indefinitely as practitioners choose not to fully commit their daily path to a project and simply perform it as and when it suits them. However, given the status of dominant projects, this is more likely to be the case for secondary, voluntary projects than ones emanating from an institution. Equally, practitioners may in the end stop trying to find the time and space needed in their daily and life paths and instead take the defection pathway. Alternatively, they may choose to commit to a project.

5.3 Committing to the project

As discussed in the last section, individuals invariably acquire different degrees of knowledge as their project performances evolve (Hui and Spurling, 2013). Warde too stresses this co-evolution between commitment and progression in a practice:

> …more than ever before, the question 'what level of commitment is displayed to different practices?' becomes focal, and with that a grasp of how 'careers' within practices take off, develop and end (Warde, 2005, p. 149).

For those that do commit to a practice or, indeed, a project, the process is transformative (Shove et al., 2012). Shove et al, also drawing on the work of the Chicago Sociology School, suggest that commitment to a practice can lead to a point where individuals "*become* that which they do" (2012, p. 70). The practice of body building is a graphic example of this. The body as a material element becomes transformed by regular performances. As "repeated performances bind practitioners and practices together in many more subtle ways. Regular trips to the gym have a noticeable effect on the muscles, strength and shape of those who devote themselves to body-building…" (Shove et al., 2012, p. 71).

Body building practices may only take a few months to start to transform elements, but other careers in a practice may take years. Hui and Spurling (2013) highlight how patchwork quilting has a history of sharing elements across generations. Thus material elements, such as pieces of cloth, are carefully kept and passed on to new quilters in the family, along with the skills and knowledge of past creations. Thus "patchwork quilters...have a difficult time expressing the temporalities of their careers according to clock or calendar time, yet highlight the importance of connections between generations …" (Hui and Spurling, 2013, p. 6).

This final stage of the conceptual framework in Figure 1, highlights how the tensions inherent in the adopting and establishing phases have evaporated. As commitment evolves, so practitioners develop new skills in their performances further reinforcing their commitment and reducing the chances of exiting from the project. Instead, the tensions between establishing and defecting give way to a

mutual reinforcing relationship between committing and transforming. The committing stage is like two magnets that change from pulling away to pushing together, when they are turned around.

As practitioners experience transformation, so too can social practices (Shove et al., 2012) and also projects given their status as a "meta-practice"(Røpke and Christensen, 2012. p.351). However, as Shove et al write "the timescales are often different. This is because the careers of practices-as-entities are defined by the performances of changing cohorts of carriers. Individuals are constantly taking up and dropping out of different practices as their lives unfold" (2012, p. 95). Thus an individual may hope to follow a particular pathway for a project, for example through saving money by cooking the food and making the wedding dress for their daughter's wedding, but finding that they have to change course after they break a leg. Equally, they may seriously commit to a project but find that their daily life path is too full and have to exit from their commitment or simply return to the establishing phase again. As Barley highlights:

> Persons might willfully choose between different courses of action as they progressed through a career. They might even dream to hope and plan. But the options they foresaw and the choices they made were always limited by contextually defined possibilities. Careers, then were pieced together from the string of alternatives … (Barley, 1989, p. 51).

6 CONCLUDING SUMMARY

This chapter has developed a framework that explores the individual in relation to projects and practices. No longer simply just a 'carrier' of practices, as project-practitioners individuals actively mobilise elements as well as orchestrate social practices to the fulfilment of projects - both dominant and secondary. However, by integrating the Time Geography concepts of projects and pathways with Social Practice Theory the framework avoids falling into a behavioural trap of focusing on individual behaviours, by continuing to concentrate on the underlying social organisation of life through shared practices and projects.

The chapter also explored whether prosuming was a social practice or a project. By framing a project as a 'meta-practice' the fulfilment of a project involves both mobilisation of materials, meanings and elements and the orchestration of social practices. This definition was successfully applied to off-gridders in the Canadian wilderness and also shown to be relevant to on-grid prosumers in the UK.

Given this, the rest of the chapter was dedicated to developing a dynamic conceptual theoretical framework for examining the evolving performances of project-practitioners over time and the different pathways they can take. By drawing on both Social Practice Theory with Time Geography

ideas, three stages were identified as relevant to the development of a framework to examine paths for project-practitioners: adopting, establishing and committing to a project. In particular, the first two stages are marked by a tension between adopting and establishing a project compared with rejecting or defecting from it. These tensions were highlighted in the social practice literature and adapted to work within a conceptual framework focused on a project. In the final stage, the tensions are reduced as the project is embedded in daily life and is replaced with the transformative effect of committing to a project - both for the project itself and the practitioner. What is explored next is how the methodology answers the research questions based on the conceptual framework.

PART 2

RESEARCH DESIGN & DELIVERY

CHAPTER 4

BUILDING THE CASE STUDY

1 INTRODUCTION

The **last chapter** used Social Practice Theory as well as drawing on concepts from Time Geography, to develop a theoretical framework for examining project pathways for practitioners. This dynamic framework charts the evolution across three stages from adopting to establishing and then committing to a project. It highlights the different pathways that practitioners can potentially take, as well as the need to mobilise both elements and orchestrate practices to the adoption and development of a project. The chapter also argued that prosuming is a project, as it involves the mobilisation of elements and the orchestration of practices by practitioners.

This chapter seeks to turn a conceptual framework into a research design for an empirical study of prosuming within the context of a social housing estate. It not only explores the underlying philosophical approach that was adopted, but also how to define a prosuming case study, and the role of serial interviews. Additionally is examines how coding and writing supported analysis. Importantly, it makes transparent the methodological iterative approach that was taken that helped shape data collection, analysis and writing. Such a flexible approach also informed the literature review and the development of the conceptual framework.

In more detail:

Section 2 summarises the key research themes coming out of the literature review and how this translated into a set of research questions.

Section 3 explores the philosophical assumptions that underpinned the research. A broadly social constructivist perspective was adopted but with a pragmatic influence.

Section 4 explores the thematic differences between qualitative and quantitative methods, and positions this study with the former. It then makes the argument for adopting a case study methodology.

Section 5 examines how the phenomenon of prosuming was examined in a case study focused on a solar PV rollout programme within a social housing estate. It argues that qualitative research is about depth rather than breadth, and the need for purposeful sampling. A list of criteria was drawn up to aid recruitment of households to the study.

Section 6 explores serial interviews as the case study method for collecting data. It includes the benefits of this method including offering interviewees time to reflect on questions. In particular, informal semi-structured interviews were adopted to enable households to raise their own issues, rather than being led by a set of fixed questions.

Section 7 highlights how as helpful as coding of transcripts is, this is just an entry point to analysis. Analysis started during interviewing before the availability of transcripts, and continued throughout the writing process. In particular, it was important to include in the thesis rich, thick descriptions to offer insights into the lived experiences of the Prosuming Project.

Section 8 shares the 'housekeeping' issues that emerged from the writing process. In particular arguing that it is generally not helpful to use numbers to quantify findings in a small qualitative sample.

Section 9 shares the formal ethical research process that took place alongside the research design.

Section 10 concludes the chapter.

2 RESEARCH ISSUES & QUESTIONS

2.1 A summary of key research themes

The last two chapters have undertaken a review of relevant literature within the fields of UK domestic solar PV studies and Social Practice Theory. The last chapter also drew on Pred's (1981, 1981a, 1981b) development of the Time Geography concepts of projects and paths. Additionally, in Chapter 1 the concept of prosuming was introduced and three solar PV prosuming studies were featured that had a socio-technical focus. Key themes that emerged from these chapters include:

2.1.1 Social practices

- The importance of understanding variations in how social practices are performed.
- Understanding the lives of individuals behind the carriers of practices.
- Issues of access, or lack of it, to particular social practices.
- Lack of SPT studies that explore potential future sustainability 'losers'.

2.1.2 Project-practitioners and projects

- The role of practitioners in mobilising elements, and orchestrating practices for the fulfilment of projects.
- The role of dominant projects emanating from institutions such as family, work or school.
- The role of secondary, voluntary projects emanating from individuals.
- The dynamic paths that project-practitioners can follow including adopting, establishing and committing to a project. As well as rejecting, defecting and transforming projects along the way.

2.1.3 The Prosuming Project

- Understanding energy demand as embedded in daily life through projects and social practices.
- Understanding prosuming as deliberately and simultaneously producing and consuming energy.
- Understanding prosuming as a project that is constituted from elements and practices that are performed by practitioners.

2.2 Conceptual framework & research questions

The literature review was initially used to develop a set of broad research questions that encompassed a number of "issues" that needed to be explored further as the study progressed (Stake, 1995, p. 29):

> Researchers differ on how much they want to have their research questions identified in advance…fieldwork regularly takes the research in unexpected directions, so too much commitment in advance is problematic...So the researcher makes a flexible list of questions, progressively redefines issues, and seizes opportunities to learn the unexpected (Stake, 1995, p. 29)

The research questions, along with the evolving literature review and conceptual framework, were regularly revisited enabling "progressive focusing" during the research (Ibid.). This involved systematically reducing the "breadth of…[the] enquiry to give more concentrated attention to the emerging issues" (Parlett and Hamilton, 1972, cited in Stake, 1995, p. 22). From this iterative process, a dynamic theoretical framework, foregrounding practitioners, projects and practices, was developed (Figure 1), alongside an overarching research question:

"How and why does prosuming evolve for social housing tenants?"

This will be answered by addressing the following subsidiary questions, which have separate empirical chapters devoted to each one.

1. What are the key energy related practices and projects **prior** to the emergence of the Prosuming Project? (Chapter 6)
2. What are the key features of the **adopting** stage of a Prosuming Project? (Chapter 7)
3. What are the key features of the **establishing** stage of a Prosuming Project? (Chapter 8)
4. What are the key features of the **committing** stage of a Prosuming Project? (Chapter 9)

3 PHILOSOPHICAL UNDERPINNING

As researchers we have certain philosophical assumptions that we bring to our work, whether conscious or not (Creswell, 2013). These have evolved from many different quarters such as doctoral training, journal (and other) articles we have read, conversations at seminars and potentially even the subjects we study at school. As Creswell highlights "the difficulty lies first in becoming aware of these assumptions and beliefs" (2013, p. 15). Self-reflection is key to this and is one of the seven commitments highlighted in the next chapter for ensuring research quality.

Although a pragmatic philosophy (Creswell, 2013) influenced my work as it offered a "problem-solving, action-oriented inquiry process' (Teddlie et al., 2011, p. 290), a social constructivist view underpinned it. In part, this was due to the importance placed by social constructivists on the context

of the research, given that I wanted to take into account the context in which the Prosuming Project was evolving (Creswell, 2013). But also, such a philosophy recognises that research can never be 'neutral', and that as researchers we play an integral role in producing knowledge, alongside interviewees. As Creswell writes, researchers from a social constructive approach " 'position themselves' in the research to acknowledge how their interpretations flow from their own personal, cultural and historical experiences" (2013, p. 25). There is an extensive body of literature on social constructivism that is beyond the scope of this thesis, but Denzin and Lincoln helpfully sum up the philosophy:

> The constructivist paradigm assumes a relativist ontology (there are multiple realities), a subjectivist epistemology (knower and respondent co-create understandings), and a naturalistic (in the natural world) set of methodological procedures (Denzin and Lincoln, 2017, p. 20).

The methodology is discussed in detail below, but is underlined by not only a pragmatic outlook, but also an assumption that there is not one truth out there to be discovered: interviewer and interviewee create knowledge together; and the site for gathering research is a community setting not a laboratory.

4 QUALITATIVE RESEARCH

Given the literature review, theoretical framework and research questions, my initial assumption was to undertake qualitative research. However, to reflect further on this, I referred to Table 2 below. Patton and Westby (1992) highlight a number of thematic differences between qualitative and quantitative research. To review where my research would sit between these two positions, I added a further column to include reflections on the study.

Table 2 Thematic differences in qualitative and quantitative methods adapted from Patton and Westby (1992, p. 5)

Theme	Qualitative strategy	Quantitative strategy	Prosuming case study
Inquiry conditions	Study of real-world situations as they unfold naturally.	Study of behaviour in experimentally controlled situations.	A study of prosuming in a social housing estate.
Analysis	Inductive - immersion in the details and specifics of the data to discover important categories, dimensions and interrelations.	Deductive - testing theoretically derived hypothesis.	An inductive approach with themes emerging from the data. But also combining this with a deductive approach for testing out a conceptual framework.
Researcher's role	Insider - direct contact/personal experience & insights are important part of the inquiry and critical to understanding the phenomenon.	Outsider - applies statistical analysis to objective data.	Looking to understand the lived experiences of families in relation to prosuming by developing a rapport with interviewees and letting them be able to guide the interview if they wish. Recognising that the researcher too brings a history, for example, 'project memories' to the study.
Orientation	Focus on the whole systems and their complex interdependencies.	Focus on discrete variables and linear, cause-effect relations.	Exploring the phenomenon of a Prosuming Project and how it evolves over three stages: adopting, establishing and committing to it.
Reality	Attention to process: reality viewed as a dynamic, changing system.	Attention to product; reality viewed as unchanging facts.	A social constructivist perspective assumes reality is multiple and constantly shifting.
Treatment of subjects -	Assumption that each case is special and unique.	Subjects viewed collectively as a group with similar characteristics.	The study is interested in the lived experiences of individual prosumers. While similarities and patterns may be revealed, this does not detract from individual contributions.
Research stance	Empathetic neutrality - researcher includes personal experience and empathetic insight as part of the relevant data, while taking a neutral stance toward findings that emerge	Objective - researcher uses objective tests that do not depend on human skill or perception.	Strives to be empathetic and where appropriate share own insights with interviewees, but aware of not 'over sharing'. Being transparent and reflective throughout the research process, and also non-judgemental of the findings that emerge. A desire to share the research as widely as possible.
Design	Flexible - modification of research design as data emerge.	Rigid - specified before project begins and cannot be modified during data collection	The research design needs to be open to iterations. As findings emerge it is important to be able to go back to the literature and in turn to shape the design as needed.

As Table 2 has been produced by well known qualitative scholars, quantitative researchers may well take issue with some of the positions presented. However, I still found the exercise helpful as it crystallised some of my thinking around these issues and confirmed that, based on my literature review and subsequent research questions, the study was closely aligned with qualitative research methods. Given this, and the research themes, theoretical framework and questions I wanted to address, I then explored the suitability of a case study methodology. I found that it is not only good at addressing how and why questions as is in my core research question (Baxter and Jack, 2008), but is also "tailor made for exploring new processes or behaviours or ones which are little understood" (Hartley, 1994, cited in Hargreaves, 2008, p. 75). As was seen in Chapter 1, there have been few studies exploring the 'phenomenon' of prosuming and only one that explores its evolution. Additionally, there were none that took an SPT approach that also drew on Time Geography.

In addition, a case study offers "intensive descriptions and analysis of a single unit or bounded system (Smith 1978) such as an individual, programme, event, group, intervention or community" (Merriam, 1998., p. 20). Again, this fitted a desire to examine prosuming within a community setting and understand a "virtual reality" (Flyvbjerg, 2006, pp. 238–239). In-depth interviews can provide stories and thick, rich descriptions enabling readers to "enter this reality and explore it inside and out, the payback is meant to be a sensitivity to the issues at hand that cannot be obtained from theory" (Flyvbjerg, 2006, p. 400). Again, this reflected my wish to prioritise individuals and their lived experiences of the Prosuming Project. Merriam highlights that a case study is particularly useful at offering insights that can be used to "directly influence policy, practice and future research" (1998., p. 19). As discussed further below, it was important for the study to be able to inform policy, particularly given the small number of studies looking at prosuming from a social practice perspective.

4.1 A case study methodology

Stake is a leading scholar on the case study as a methodology using a social constructivist perspective as "most contemporary qualitative researchers nourish the belief that knowledge is constructed rather than discovered" (Stake, 1995, p. 99). He is concerned with how a case study is defined - its "boundedness" (1995 p2). This is not always a straightforward process (Merriam, 1998) as demonstrated in the following passage from Stake:

> A child can be a case. A teacher maybe a case. But her teaching lacks the specificity, the boundedness to be a case. An innovative programme may be a case. All the schools in Sweden can be case. But a relationship among schools, the reasons for innovative teaching or the policies of school reform are less commonly considered a case (Stake, 1995, p. 2).

Merriam (1998) offers some practical insights into how to identify a case study. For her it is about a case study being finite, for example, a specified time frame or geographic location (Merriam, 1998.). Another is the number of people that could be potentially interviewed. If the boundary is vague and the numbers of potential interviewees wide open, this should ring alarm bells that a case study is not an appropriate methodology. As she writes:

> If there is no end, actually or theoretically, to the number of people who could be interviewed or to observations that could be conducted, then the phenomenon is not bound enough to qualify as a case (Merriam, 1998., p. 28).

Similarly Miles and Huberman (1994) also draw attention to using the case study to focus on "a phenomenon of some sort occurring in a bounded context" (cited in Baxter and Jack, 2008, p. 545). This reflects a description by Yin that "a case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context." (1994, p. 13).

Stake (1995) highlights three different types of case studies: intrinsic, instrumental and collective. An **intrinsic** case study is developed because a researcher has an interest in finding more about the case. It is not particularly undertaken to develop theory or does not stand out in any particular way other than to offer insight in a particular case, for example, to evaluate a programme. An **instrumental** study is quite different. For example, this would be developed if it was felt that a particular case study could throw light on a research puzzle or research questions, as in the case of this study. A **collective** case study refers to more than one case.

Additionally, **longitudinal case studies** are good at exploring "micro-level change" over time, again potentially helpful in this study (Lewis, 2003, p. 54). They are also helpful, if "one is studying a process which has a notion of a 'career' of some sort or which involves a developmental process" (Farrall, 2016). As we saw in the last chapter, while the conceptual framework explores practitioners, projects and pathways, this could also be framed in terms of a "career" in a project (Hui and Spurling, 2013, p. 1). Another key benefit of a longitudinal case study is that it could be both prospective and retrospective (Farrall, 2006; Merriam, 1998.). Prospective, in so far as the phenomenon can be studied as it unfolds, but also retrospective as it "allows for respondents to reflect on the changes (or lack of them) which they have experienced since the previous interview" (Farrall, 2016).

5 PROSUMING - A LONGITUDINAL CASE STUDY

5.1 Bounding the case study

While I was carrying out the literature review and still determining the direction of the research, I made contact with a number of solar installation companies to discuss potential ideas for an empirical study. A few months later, one of them told me about a solar PV installation programme by a social housing landlord, who was also the Local Authority[2] for the area. This was of immediate interest because it related to the issue of sustainability 'winners and losers' (Walker, 2013), as well as fitting Patton's (1990) description of "opportunistic sampling":

> Unlike experimental designs, qualitative inquiry designs can include new sampling strategies to take advantage of unforeseen opportunities after fieldwork has begun. Being open to following wherever the data leads is a primary strength of qualitative strategies in research. This permits the sample to emerge during fieldwork (Patten, 1990, p. 179).

Following the 'data lead' I contacted the Local Authority about my research ideas and they agreed to collaborate on the understanding that I would share any relevant learning with them. Assuming I found tenants who were happy to also collaborate, I had found the 'case' I was hoping for: a solar PV roll out programme where I could examine the phenomenon of a Prosuming Project within the context of an estate that was predominately social housing. It was bounded temporarily - the solar PV panels were installed over the summer of 2014 - and geographically, as it was located on a single estate. It also met Merriam's (2002) rule of being a finite number of households eligible for the solar panels - approximately 150 out over 1000 households. The location for the solar PV programme, was not only an estate that included social housing tenants, but was also within an area rated highly on multiple deprivation indices (DCLG, 2015). Beyond living in the area, the Local Authority relied on technical criteria to select the households, for example the position of the sun in relation to the house or whether there was any shading of the roof. While the households had a choice in whether the solar panels were installed or not, they could not nominate themselves for the scheme as there were not enough panels to cover every household in the area.

Such a case study would allow me to explore my conceptual framework that focused on prosuming-practitioners and the different pathways they would take. The case itself, a solar PV roll out programme, while of interest, was not my main focus. Instead it was the practitioners and their lived

[2] I will refer to the terms social housing landlord, Local Authority and 'council' interchangeably throughout the thesis as, in this study, they are one and the same. I specifically do not name the Local Authority as explained in the Ethical Review section of Chapter 4.

experiences of the Prosuming Project, rather than how the local authority rolled out a particular programme with its tenants. Given this, the research was best suited to an instrumental case study as as "it provides insight into an issue or helps to refine a theory. The case is of secondary interest; it plays a supporting role, facilitating our understanding of something else" (Stake, 1994, p. 237). In addition, the study was also a longitudinal case study at it examined the phenomenon of project-practitioners and the Prosuming Project over four seasons. Given I had found my case study, I now needed to determine my sample.

5.2 Determining the sampling size

Qualitative research is often about gaining rich insights into a phenomenon rather than making generalisations about a wider population. Firstly, it is important to ensure the sample is as diverse as possible, so there is the most chance of exploring the key characteristics that will be important to the research (Ritchie et al., 2003). However, the more diverse the sample, the greater the number of interviewees will be needed to see patterns emerging. This can present a dilemma for the researcher as the larger the sample size, the harder it becomes to carry out an indepth study:

> ...the type of information that qualitative research studies yield is rich in detail. There will therefore be many hundreds of 'bites' of information from each unit of data collection. In order to do justice to these, sample sizes need to be kept to a reasonably small scale (Ritchie et al., 2003, p. 84).

Within qualitative research the size of the sample is a very different issue to quantitative studies. As Mason points out:

> …frequencies are rarely important in qualitative research, as one occurrence of the data is potentially as useful as many in understanding the process behind a topic. This is because qualitative research is concerned with meaning and not making generalised hypothesis statements" (2010, p. 1)

Unlike quantitative studies based on probabilities, there is no magic number about how many interviews are enough for a research study (Guest, et al., 2006). Instead, some researchers follow the notion of 'saturation point' "when the collection of new data does not shed any further light on the issue under investigation" (Mason, 2010, p. 2). Guest et al (2006) argues that while the idea is helpful from a conceptual point of view, it offers no real guidelines as to what constitutes saturation in terms of sample sizes. Often ethics committees, as in my case, require the researcher to specify how many people they are intending to interview from the outset. It could also undermine a longitudinal study if new research participants were added randomly during the study if following a notion of saturation.

Guest et al (2006) examined the issue of sample sizes for qualitative research by analysing their own research, which involved in-depth interviews with 60 West African women. They discovered that some of the key themes were reached after only six interviews, and saturation point was evident within the first twelve. They concluded that for most qualitative research that has a high degree of homogeneity, a sample of six might well suffice. This reflects Kuzel et al (1999) recommendations of six to eight interviews for a sample that, again, is considered fairly homogenous, or 12 to 20 when looking for maximum variation. However, this is assuming one off interviews, rather than a number over a time period. Mason (2010) review of the literature suggests that longitudinal studies need smaller sample sizes because they draw on a series of in-depth interviews.

However, this discussion on sample numbers does not necessarily hold for a case study. As Stake (1995) highlights, a case study could be just one student or an entire class of college students, depending on its focus. In the case of prosuming, one interviewee would fail to offer the variations in performances that this study wanted to elicit, but also interviewing 50 people would not allow for understanding the lived experiences behind the practitioners.

Instead, I followed the advice of Guest et al (2006) and Kuzel et al, (1999) that if I could find a fairly homogenous group then six interviewees should be sufficient. This also assumed that only one interview would take place, while I planned to spend considerable time with my interviewees carry out a series of semi-structured but conversational interviews to build rapport and capture the evolving relationship between practitioners and the Prosuming Project. In the end I recruited seven households that had been selected as they matched a set of sampling criteria, as well as helping to increase homogeneity. I also undertook 52 interviews across a ten month period.

5.3 Determining the sampling criteria

Unlike quantitative research, qualitative does not generally undertake probability sampling, which offers statistically valid samples (Ritchie, 2003). Instead qualitative research is about finding samples that offer in-depth insights into a study through identifying particular criteria such as "socio-demographic characteristics, or may relate to specific experiences, behaviours, roles etc." (Ritchie et al., 2003, p. 78). Importantly such purposeful sampling, offers the opportunity of highlighting disadvantaged groups who may not appear on the radar of a probability sample (Ritchie et al., 2003). In my case social housing tenants living in a geographic area with high multiple deprivation indices.

> They argue (Feagin et al 1991 p 273-4) that case studies, as opposed to survey-based statistical research, avoid the methodological individualism of probability sampling, which misleadingly

> treats individuals as independent and equal and so conceals the realities of power in a stratified societies (Platt, 2007, p. 103)

Drawing on the literature review and research questions, I compiled a list of sampling criteria as detailed in Table 3 below. At the top of the list was eligibility to the solar PV programme. The Local Authority chose an area with high multiple deprivation indices (DCLG, 2015) for the solar PV programme as one of its goals was to help address energy poverty as well as reducing carbon emissions.

In terms of my sampling criteria, the household needed to have been selected by the Local Authority for its solar PV scheme - this ensured that any potential interviewees were living in a low income area. I decided to add the use of a prepayment electricity meter to the sampling criteria, as a further indication that the household was likely to have a low income, given the correlation between the two:

> Over six million homes in the UK pay for their energy through prepayment meters (PPMs). The majority are low-income households, and more than half receive some kind of means tested benefit or disability benefits such as DLA. Over one third of prepayment households have one resident with a disability or long-term physical or mental health condition, and almost half are home to children aged 16 and under (Cooper, 2014, p. 7)

Additionally, I included sampling criteria of at least one child or young person under 16 years old, living at home. This helped to increase the homogeneity of the household, as well as reflecting the call by Hargreaves et al, to carry out further energy research that reflects "whole households rather than simply individual householders" (2010, p. 6118). However, in the end I largely focused on one individual in most of the households, as it was often difficult to arrange interviews with more than one person given how busy they all were. If however, other people were present they sometimes chose to be included in the interview.

Other criteria for increasing homogeneity was that the housing was of a similar size and age, although research also highlights that energy demand can vary widely even in similar buildings (Middlemiss and Gillard, 2015). I also drew the sample from a close-knit geographic area - all the households were within a mile of each other, for example covering the same local schools and shops. Given that solar power is generated in daylight, I also ensured that at least one person from each household was generally at home for at least part of the week during the day. In addition, I only included households in the study who were eligible but who had not yet received the solar panels, as I wanted to explore energy demand prior to and post installation. To ensure some degree of variation within the sample, I included households with a mix of employed and unemployed members, as well as two parent households and those with just one parent.

Table 3 Criteria for homogenous sample

Solar PV

- Eligible for solar PV programme
- Available to be interviewed prior to solar PV panels installation
- One person regularly at home during the day for at least part of the week, from Monday to Friday

Property

- Living on an estate with high level of multiple deprivation indices
- Living in a house less than 20 years old and of similar size and levels of insulation
- Living within 1.5 miles of each other
- Using a prepayment electricity meter

Demographics

- At least one child under 16 living at home

Criteria for variation within the sample

- Single parents
- Parents living together
- Employed
- Unemployed

5.4 Recruitment of interviewees

In order to recruit potential interviewees, I was invited by the Local Authority to accompany a solar PV surveyor on his home visits to assess interest and suitability amongst households who had been selected as eligible for the solar programme. In July 2014 I joined the surveyor on three separate occasions. While many of the householders were not at home, we came across 14 of them who had children and were also happy to receive an initial information sheet (Appendix A). Eleven of these householders wanted to find out more and gave me their telephone number for a follow up phone call. This enabled me to identify six households that met the full criteria detailed in Table 3, as well as offering some variation in the sample. In addition, the installer separately identified a further householder who was interested in the study, and who also met the criteria.

I then arranged to meet all seven households, prior to the installation of their solar panels, during July 2014. This was an opportunity to explain the research and their potential roles as interviewees, as well as answering any questions and give them a more detailed information sheet (Appendix B). All seven households were happy to take part in the solar study and gave their informed consent by signing the form in Appendix C. I did not want to create unnecessary extra meetings so used this opportunity to

conduct the first interview that took place before their solar panels were installed. Again, all the households were happy to do this.

The result was the recruitment of seven households from an estate that was largely social housing, and all living within a mile of each other. Given the issue of sample 'mortality' (Robson, 2002), particularly in longitudinal studies, I would have preferred eight households but this would have meant compromising the sampling criteria. For example, one woman would have been suitable but a holiday meant that she was not available to be interviewed prior to the solar installation. Another, again met all the criteria, but did not have a prepayment meter, undermining the homogeneity of the sample.

However, seven households still afforded me a safety net, given that, as discussed above, six indepth interviews are considered a reasonable number for a homogenous sample (Guest et al., 2006; Kuzel et al., 1999). What is more, I did not just undertake six interviews but over 50, including with additional family members, over a ten month period. In four out of seven households I was able to interview partners and, in one case, two teenagers. In terms of numbers of interviewees, when taking into account additional family members, I had a total of 13.

5.5 Retention of interviewees

At the outset, I was hoping for more family members to be involved in the study. However, as it progressed I increasingly realised this was too high an expectation given the time required and that each household already had one person who had committed to the study. So although I was able to draw on 13 interviewees, I was also able to interview the same person from each household across the ten months to ensure consistency. Additionally, this main interviewee had also been the main contact for the solar installation company and, in most cases, was also the person responsible for ensuring the prepayment electricity meter was in credit. All the main interviewees led busy lives, and I had to retain utmost flexibility to fit round any time they could give me for interviews. I was extremely fortunate that all of them remained committed to being involved in the study across the ten months, although they faced numerous challenges over this time. This included a death within the extended family, losing a job, a child being taken out of school and, for many, the everyday worries that come from not having enough money. In one case, an interviewee took some time out from the study over the winter due to personal reasons, but returned for the final spring interview. In terms of other family members the interviews were more spontaneous depending on their interest and availability. While this did not offer the whole household view that Hargreaves et al (2010) suggests is important for energy research it further enriched the case study by adding more interviewees and more voices to the research. In total over four seasons I conducted 52 interviews across seven households (Table 4).

Table 4: Interviews per household across the four seasonal research periods

Interviewees **To ensure anonymity, pseudonyms have been used and some details changed**	**Period 1** **Summer** **Jul 14 (pre solar PV)**	**Period 2** **Summer-Autumn** **Aug 14 - Oct 14**	**Period 3** **Winter** **Nov 14-Jan 15**	**Period 4** **Winter-Spring** **Feb 15-Apr 15**	**Total** **Interviews 52**
HOUSEHOLD 1					
Irene - main interviewee	1	2	1	2	6
Tony	X	2	X	X	2
Irene and Tony have three boys and one girl aged between 4 and 15 years. Irene is at home due to childcare responsibilities. Tony is in and out of work due to zero hour contracts, but was unemployed during the research so was around during the day.					
HOUSEHOLD 2					
Frankie only interviewee	**1**	**1**	**1**	**1**	**4**
Frankie and her husband have three girls aged between 4 and 12. Neil is out at work all day and Frankie combines childcare with part time work, and is therefore home for part of the day during the week.					
HOUSEHOLD 3					
Val - only interviewee	**1**	**1**		**1**	**3**
Val is divorced and has two children a boy and a girl aged between 9 and 12. One is registered with a disability. Val is a full time carer and is often at home.					
HOUSEHOLD 4					
4 Barbara only interviewee	**1**	**1**	**2**	**2**	**6**
Barbara lives with her husband and 15-year-old son and is home for some of the day because she works part time. Her husband is occasionally at home because of a zero hours contract.					
HOUSEHOLD 5					
Maggie - main interviewee	**1**	**2**	**2**	**2**	**7**
Harry	X	1	1	1	3
Maggie and Harry have one ten-year-old daughter who is registered with a disability. Maggie does not work outside the home and Harry can only get part-time work so he is at home during the day from time to time.					
HOUSEHOLD 6					
Zoe - main interviewee	**1**	**2**	**2**	**2**	**7**
Will	1	X	X	X	1
Tracey - 19 year old daughter	1	X	1	1	3
Ben - 16 year old son	1	X	1		2
Zoe and Will have three children aged between 15 and 19. They live with Zoe who works part time shifts, so is occasionally home during a week day. The same is true for her children depending on college and work hours.					
HOUSEHOLD 7					
Ed - main interviewee	**1**	**2**	**2**	**2**	**7**
Jane	1	X	X	X	1
Ed and Jane have four children. The two that are at home are aged between 14 and 19. Their son is registered disabled. They both work irregular shifts and, while they are occasionally at home during the day, they are not necessarily awake.					

6 RESEARCH METHOD

Given the amount of time that the households were giving to the study, I decided in the end to use only one data method - interviewing. As discussed in the next chapter, I was initially interested in other data methods, in particular an energy walk of the household. Although I had permission for this from the interviewees, as the field work unfolded, I increasingly realised that it felt unethical to ask the households to give any more time to the project. In addition, I was already collecting a rich data set that I was not convinced an energy walk would significantly enhance. Increasingly I also became aware that the serial interviews I was collecting from across seven households and four seasons offered a multiplicity of viewpoints. As Lewis highlights below, such data does not have to come from different methods:

> In essence, we see the primary defining features of a case study as being multiplicity of perspectives which are rooted in a specific context...Those multiple perspectives may come from multiple data collection methods, but they may also derive from multiple accounts - collected using a single method from people with different perspectives...(Lewis, 2003, p. 52).

6.1 Serial interviews

Despite some concern that interviews "can only ever provide an unsatisfactorily washed out account of what previously took place" (Hitchings, 2012, p. 61), they are still, invariably, central to the research of qualitative researchers (Ritchie, 2003). While Hitching highlights that there has been a backlash against the method from some scholars of everyday life, he argues that interviews can be an effective and pragmatic method to understanding about practices:

> My point is rather that researchers in this field reject the common qualitative interview at their peril. This is because interviews offer such an efficient means of understanding how it is to embody certain practices when it may be exactly such understandings that could prove crucial in initiating positive change. Encouraging people to talk about their practices may not always be easy, but that does not mean it is not worth trying (Hitchings, 2012, p. 66).

Strenger's research into energy demand and practices, also relied primarily on domestic interviews as she argued the method was understood by research participants:

> The routine nature of interviewing allowed me and my participants to focus on the invisible realm of domestic practice without significant discomfort or displeasure. Participants who would be otherwise unwilling or reluctant to share private information about their household practices were situated in a context where such interrogation was largely accepted and expected (Strengers, 2009, p. 73).

In particular, Hitching highlights the value of serial interviews that enable research participants to "work through the reasons behind certain everyday actions and helped their researchers identify

effective lines of further questioning" (2012, p. 66). Serial interviews consist of a series of indepth interviews with the same group of people and are often "suitable for research that aims to explore evolving and complex processes or when time is needed to develop a relationship between researcher and participants" (Farrall, 2006, p. 66). Crang and Cook highlight how in single interviews most participants do not relay stories or arguments that are fully developed, but serial interviews can give them time "to flesh out these concepts, stories and arguments, to help to make them fuller and more understandable" (2007, pp. 76–77). They point out that this type of interaction is not normally achieved in a single interview through repetition of a question but tends to emerge; "through dialogue with the researcher that develops over a number of visits (Ibid.).

6.1.1 'Conversation with a purpose'

However, there is a significant difference between a highly structured interview, which leaves little room for improvisation, and the more informal, unstructured interviews which are often used by ethnographers (Fontana and Frey, 1994; Hards, 2011). Lying somewhere along this continuum, is the semi-structured interview that too can vary considerably in format depending on context and researcher:

> …there are different models of semi-structured interviewing, and terms are not necessarily used consistently, so that what some commentators describe as 'semi-structured' interviews may be described by others as unstructured or in-depth or, at the other end of the spectrum, open-ended survey interviews (Arthur and Nazroo, 2003, p. 111).

Kvale (2008) highlights the importance of understanding the underlying epistemological approach to knowledge creation for the different styles of interviewing. The first metaphor she draws upon sees knowledge "as buried metal and the interviewer is a miner who unearths the valuable metal. The knowledge is waiting in the subject's interior to be uncovered, uncontaminated by the miner" (Kvale, 2008, p. 48). The second is a metaphor of a traveller who "walks along with the local inhabitants, asks questions and encourages them to tell their own stories of their lived world" (ibid.) Given my social constructivist approach, I was much more comfortable with being a traveller than a miner. A traveller recognises "interviewing as a social encounter" and that the "interview is not merely a neutral conduit or source of distortion but rather the productive site of reportable knowledge itself" (Holstein and Gubrium, 1995, p. 3).

For the study, I undertook semi-structured, in-depth interviews that changed over the course of the ten-month study as interviewees became familiar with the format and also started to trust the process and me. As rapport developed between myself and the interviewees (Fontana and Frey, 1994) the interviews become more relaxed, but always remained a "conversation with a purpose" (Webb and

Webb, 1932, cited in Legard et al., 2003, p. 138). They took place in the homes of the interviewees, in a mix of kitchens and living rooms, often with children in the house. So in addition to the interviews I also had the opportunity to informally observe their lived experiences as meals were cooked, washing put on and, at times, arguments aired. While I did not record these observations, as I was not undertaking an ethnographic research project, the context was useful in analysis, for example often reinforcing the central role of washing machines and tumble dryers to many of the households.

For the first interview with each household, I used a research topic guide (Appendix D) that in part reflected my theoretical framework at the time. The topic guide worked for the first interviews because there was a lot of material to cover including electricity 'hotspots' and "practice memories" around energy use in the home (Maller and Strengers 2013, p. 245). However, by the time the second series of interviews were due to start, the topic guide felt a little too prescriptive and inflexible; I wanted to create a space so conversations could unfold in directions I may not have anticipated (Hards, 2011) – critical to capturing lived experiences of the Prosuming Project (Middlemiss and Gillard, 2015). I also wanted the flexibility to build up on themes that were emerging from earlier interviews.

I therefore drew up a much more basic interview checklist (sample in Appendix E) that could easily be adapted depending on the focus and what had happened since we last spoke. As Fraser points out "engaging participants in relatively informal and friendly ways, we sometimes process stories with participants along the way, and allow for stories or comments that do not appear to be immediately relevant" (Fraser, 2004, p. 185). She adds that by "taking the time to 'really listen' (Anderson and Jack, 1991), researchers may refer to a topic-based interview schedule but are not governed by it" (Ibid.).

Importantly, I wanted to learn about the families lived experiences with the Prosuming Project. Middlemiss and Gillard assert that such experiences are more likely to be shared by qualitative research that draws "on data gathered in a relatively unstructured way allowing research participants to contribute their own categories and ideas to the research..." (2015, p. 148). Although I had a basic checklist of issues I wanted to discuss with the households, I also let the conversations evolve as I got to know the families over the months. I was, however, aware of the difference between a chat over a cup of tea and not losing sight of the issues I was hoping to cover with them. What is more, I felt I had an ethical duty to manage these conversations with the households given that I was not a family friend but someone who was only temporarily in their lives.

By being flexible in how the interviews were conducted, I was privileged to be given some insights into the lived experiences of the households that were highly relevant to the Prosuming Project. This

was not just the 'heat or eat' type decisions that a number of them faced, but other not so obvious issues such as children being excluded from school and the impact this had on the further squeezing of time in daily paths. I am convinced that these issues would not have emerged if I had used a highly structured interview process, or even kept to my original topic guide.

Despite conducting a series of interviews over a ten month period, individual interviews did not generally feel rushed, although I was always mindful that the participants were busy people. Occasionally, an interview had to be slotted in between work and a school run, but there was always the potential to visit again or follow up with a phone call if this was more convenient for the interviewee. The interviews lasted from a brief six-minute telephone call to 81 minutes for a lengthy home visit. However, most interviews were face to face and lasted around 40 minutes.

7 ANALYSIS & WRITING

In this section I explore how coding, analysis and writing evolved during the study. Initially these activities took place sequentially, but increasingly as I immersed myself in the writing process they were often undertaken simultaneously. Despite this iterative approach, I outline below a number of key stages that emerged and how they were instrumental in shaping the thesis.

7.1 Initial analysis

Even before I started coding and analysing my interview data using the NVIVO software, I felt I had been analysing the data during the many hours I sat in interviews and then reflected on them afterwards. For example, early on in the interviews, I could see the emergence of institutions as an important influence in the evolution of prosuming. I was reassured to read that for many qualitative researchers this was process was normal, as "data analysis is simultaneous with data collection. That is, one begins analysing data with the first interview..."(Merriam, 2002, p. 14).

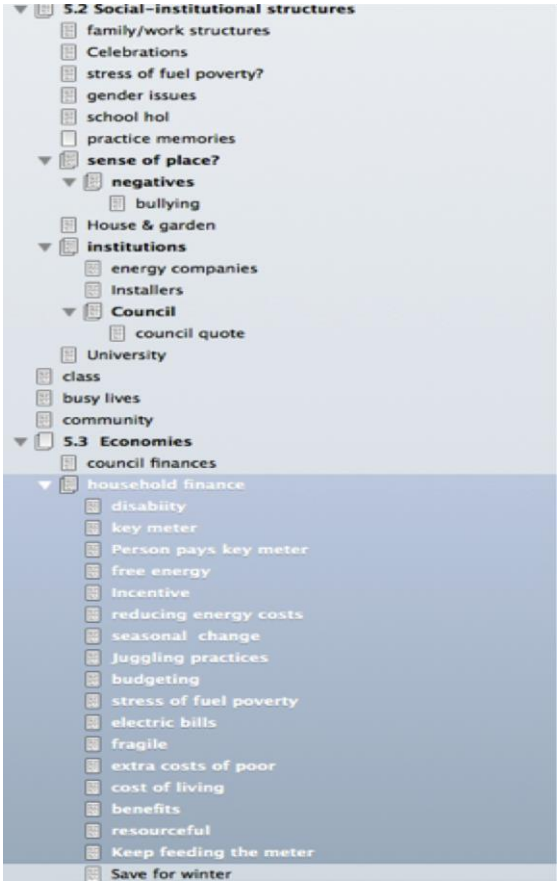
As the interviews were undertaken, they were professionally transcribed which enabled me to import them into the qualitative software programme NVIVO. I coded hundreds of pages of verbatim transcripts using both an inductive approach - being led by the data - as well as a deductive approach drawing on my theoretical framework. I ended up with dozens of separate codes that included titles such as 'single parent'; 'sun as cue'; 'money saving'; 'hectic life'; 'stress' and 'school holidays' (see Appendix F).

The initial process of creating the codes was key to "moving beyond concrete statements in the data to making analytic interpretations...an interpretative rendering that begins with coding and illuminates studied life" (Charmaz, 2006, p. 43). What I started to see emerging from the coding, confirmed some of my initial thoughts, particularly the significant role of the institutional projects to the Prosuming Project. However the conceptual framework was also vital in encouraging me to dig deeper in certain areas as well as to "overcome the impulse to explain 'one damn thing after another'..." (Barnes, 2016, p. 64).

7.2 Diving in deeper

However, as helpful as the NVIVO was in capturing my initial first thoughts, I found the coding a cumbersome process, particularly as the software had limited functionality on a Mac. Given this, I decided to experiment with using the word processing package Scrivener to support the analysis. This initially involved cutting and pasting the codes and transcription quotes from NVIVO to the Scrivener software, as illustrated in 2 below.

Figure 2 - An example of NVIVO codes imported into Scrivener



Once the codes and accompanying quotes were imported into Scrivener, I found the analytical process much more flexible as it was tied to an interactive table of contents. Thus I could easily create,

merge or cut sections or even whole chapters. This iterative way of working was an important breakthrough for me as it offered a more visceral way of working with the codes and the data behind them. Just as importantly I would, from time to time, break away from the Scrivener's linear structure and create an A3 mind map - in effect an organic spider's web - to try out new ideas and potentially linkages. Hargreaves used yellow post-it stickers to achieve a similar process. Like me, it was "not to tidy up and concretise all aspects of my data, but instead to sort it into different meta-categories and explore the many and various different perspectives, events, stories, and concepts within each of them, as well as how they fitted together" (Hargreaves, 2008, pp. 98–99). The use of Scrivener and mind maps enabled an active engagement with the data, and thus a more in-depth analysis. Ultimately, however, as Crang and Cook argue, it is not the tools that are important, but the process that they create:

> It's about chopping up, (re) ordering, (re) contextualising and (re) assembling the data we have so diligently constructed. It's about translating a messy process into a neat product (Crang and Cook, 2007, p. 133).

7.3 Writing 'into' analysis

However, analysis did not stop at creating an iterative table of contents, or a series of messy mind maps but, just as importantly, continued throughout the writing of the thesis. As Crang and Cook state "the discipline of piecing materials together into a textual account often reveals the flaws and contradictions buried in our materials, forcing us to look again and rethink our ideas" (2007, p. 133). I followed what Pelias describes as "writing into" my analysis:

> When **writing up** a subject, writers know what they want to say before the composition process begins. When **writing into** a subject, writers discover what they want to know through writing. It is a process of using language to look into, lean into and lend oneself to an experience under consideration (Pelias, 2011, p. 669).

Again, the Scrivener software helped. It had a feature that could take a 'snapshot' of a passage, section or entire chapter. I could then go away and significantly change it knowing that I could easily return to the original and see the amendments I had made. Also as discussed above, the progressive focusing (Stake, 1995) of ideas, research questions and reviewing the literature and conceptual framework, continued across the writing of the thesis to help hone the arguments and increasingly enable me to start to 'see the wood for the trees' . This iterative process also enabled further explanations as I uncovered new layers of analysis.

7.4 Creating vulnerable texts

My overarching research question was focused on how the phenomenon of how prosuming evolves, and to answer this I needed to constantly pivot between the experiences of seven different households across four seasons. The process of going between transcripts, codes, quotes and an evolving table of contents on the one hand, and the theory and the literature on the other, helped me to understand the evolution of prosuming within the context of the study. But simultaneously I was aware that while this addressed the overarching research question, I was concerned that the interviews did not just become reduced down to a series of codes and quotes rather than capturing the lived experiences of seven individual families and the Prosuming Project. I sympathised with Crang and Cook's concern of "wrenching this data out of the contexts in which it was generated (in those interactions between those people, there and then), and inserting it into an entirely new context in which it will be judged (in that piece of writing, in relation to those other quotations, ideas, theoretical points, literature, etc., by those examiners)" (2007, p. 160). One of the attractions for me of a case study was the potential for thick descriptions and narrative stories to give an understanding of the lived experiences of the households. Such an approach offers the opportunity to "provoke vicarious experience and a sense of being there with the researcher in their interaction with the case" (Hyett et al., 2014, p. 7). To aid this process I followed Crang and Craig's use of "vulnerable text":

> Creating vulnerable texts means admitting that the strength of ethnographic research and writing includes its affective capacity to move us and to evoke an emotional response (Ellis and Bochner 2000). It certainly means letting our participants' personalities come through more, and trying to give them as much respect and room to talk to each other and to us in the text as we did in the field (Crang and Cook, 2007, p. 166).

So I quoted liberally from the research interviews to give an insight into the daily lives of the families and how, for example, the Prosuming Project helped to reduce some of the difficulties of trading off one valued social practice against another. Once I had written my first draft of the thesis I realised I wanted to include more of lived experiences of the households to prevent the disembodiment between interviewees and analytical themes. So I included in Appendix G, a summary of the pathways each of the seven households took across the adoption, establishment and commitment stages, in addition to setting the scene of their lived experiences in relation to energy demand in the Prologue (Chapter 6). This process opened up a new wave of analysis as it highlighted how individuals became different types of prosumers at different points in the journey. This then led on to the creation of a typology of prosumers based on the research. This reflected the arguments of White et al that a case study "can be a very effective way of presenting profiles of different groups within the study population" (White et al., 2003).

8 HOUSEKEEPING

Finally, there are some prosaic points to raise in relation to the writing of the thesis. I agree with White et al (2003) that reporting numbers in qualitative research, particularly small samples, can be meaningless:

> Is three or nine meant to be significantly high or low, and even if the reader tried to work this out in relation to the sample size, their conclusions would not be meaningful because of the small and purposive basis of the sample design (White et al., 2003, p. 311).

Given that I had chosen purposeful and not statistical sampling, I have generally avoided quantifying the findings as it undermines the qualitative approach I have taken. However, in the desire to be as clear as possible I have developed the following to give some sense of the numerical status of certain words:

- 'All' = 7 households
- 'Few' = 3 households or less
- 'Majority' 4+ households
- If one or two households stand out from the rest I will also make this clear.

I have also followed White et al's advice that "a small amount of editing maybe needed to aid comprehension", as well as using ellipses where I have omitted words from a quotation and a square bracket where I have added to it (2003, p. 313).

9 ETHICAL REVIEW

Alongside designing the research, it was also necessary to seek approval from Sussex University's Social Sciences & Arts Cross-Schools Research Ethics Committee that takes into account best practice in research ethics, as well as complying with legislation and regulatory and funding requirements.

Submission to the committee included information on my research methods and how I addressed issues of informed consent. I also included information sheets on the project, consent forms and an interview topic guide. As I was interviewing families, I also applied to the panel in case I needed to interview any young people under 18 years old. This immediately put my application into the higher risk category with a more stringent review. While it meant that the process took longer, I was happy to have these extra demands made on me to ensure I had considered all aspects in reviewing the ethics of my study. Additionally, I applied for a Criminal Records Bureau check even though this was not

required as I was only ever planning to interview young people with their parents present. However, as a mother myself I wanted to offer the parents this reassurance as I was visiting them in their homes. In the end, young people were not the focus of my research, but it was important to have permission to talk to them if the situation arose, which it did in one household.

I also explained to all the interviewees that I would not use their real names in any material that was published. A number were not concerned about confidentiality and were happy for their names to be used. However, in order to protect those who did not want their names used, I decide that all information would be anonymised given that the interviewees lived within the same community. So throughout this thesis I have used pseudonyms for the interviewees. However, I decide to go further than this given I was using a case study methodology focused on one geographic area. I thus followed White et al's advice: "it may be necessary to alter the description of the location in which a person or organisation is located, broaden their age to a wider category or change insignificant points of detail"(White et al., 2003, p. 313). Thus, I have not named the local authority or the area in which the study was undertaken, in this thesis.

Another ethical issue was reciprocity - I wanted to ensure that the time the families were giving to the project was respected and valued. However, I also did not want to unduly influence them to take part in the study because of what they might receive - particularly as the study was being conducted in a low-income area. So in my initial conversations with the families I did not mention any gifts as a thank you for the time they were giving to the research,. Additionally no households asked if they would receive anything. I only raised the issue of reciprocity once all seven households had signed their consent forms to take part in the study. At this point I explained that their social housing landlord, who was also the Local Authority, had given a £30 voucher to thank them for participating in the University study.

In addition, my research funding was able to provide each household with an Apple Ipad. This was a gift in recognition that the research was longitudinal and consisted of a series of interviews, but also could be used by households to record their thoughts on the solar panels, between meetings. As only a small number of the households sometimes used the iPads to record their thoughts, I did not include these reflections in my analysis. Also I originally had planned to send texts as prompts for the interviewees to help them reflect on the solar power using a diary format. However, in the end I did not pursue the texts as, like the video energy walks, I had been considering, these also would have made additional demands on the households who were already generously giving their time for the serial interviews. In terms of reciprocity, the interviewees really appreciated being given an Ipad to

thank them for their time. It was seen as a valuable and appropriate gift as different family members could use it.

10 CONCLUDING SUMMARY

This chapter explains the journey I took in designing and implementing the field work. It shows how the design evolved from the literature review and research questions, but also my evolving philosophical position. This led not only to a qualitative approach, but also to adopting a case study, that took a social constructive approach and offered a high degree of flexibility.

I was fortunate to have the opportunity to collaborate with a social housing landlord on their solar PV programme. Through purposeful sampling, I found seven fairly similar households that let me follow their solar PV journeys over four seasons. I used serial interviews to collect the data, which had many advantages, not least the opportunity to revisit topics when needed and the chance for research participants to consider their thoughts on solar PV over time. In addition, the method enabled a more conversational style to be developed encouraging interviewees to offer insights, which may not have come from a highly structured interview. This in turn helped me to understand some of the lived experiences behind the Prosuming Project and share some of the vulnerability that emerged during the research.

The analysis and writing were closely interwoven, including forays into new literature when needed. While I had successfully submitted the research design for the University's ethical review process prior to starting the study, I increasingly realised that as the field work progressed I had to remain alert to ethical issues, along with maintaining the quality of the research. It is to these two subjects that I now turn to in the next chapter.

CHAPTER 5

COMMITMENTS: TRUSTWORTHINESS & RESPONSIBILITY

1 INTRODUCTION

The **last chapter** outlined the research issues, questions, design and implementation. It highlighted a social constructivist perspective and how this could be applied to an iterative, case study methodology. The focus of the case study was to examine the phenomenon of the Prosuming Project in a solar PV programme for social housing tenants. It involved carrying out serial interviews across ten months from seven households. Analysis continued throughout the whole process including data collection, coding and writing.

This chapter evolved as I engaged with questions about research quality. What started out as a concise discussion on research quality, evolved into a much deeper exploration into issues of trustworthiness and the particular responsibilities I felt I had to the interviewees given the disadvantaged community in which the study was undertaken.

In more detail:

Section 2 problematises the concepts of reliability, validity and generalisability for qualitative research, and offers new ways to look at them from a qualitative research perspective.

Section 3 explores how as a qualitative researcher I needed to address issues of trustworthiness within the study. These reflections also highlighted the importance of the responsibility I had to the interviewees in the study - particularly given the context of the low-income community in which they were living.

In **Section 4** I examine the seven commitments that underpin the research. The **first,** involves sharing the research journey. The **second,** highlights the importance of self-reflection during the process. The **third commitment** is to maintain an ethical awareness throughout the whole study, while the **fourth**

directly addresses concerns of inadvertently influencing the findings. The **fifth** concerns the importance of seeing research methods not just from an academic perspective but also through the eyes of the interviewees. The **sixth,** highlights the importance of applying the research to the real world to try and make a difference, however small. The **seventh**, and last, commitment argues for drawing on different genres to widen access to the research.

Section, 5 concludes the chapter.

2 PROBLEMATISING RELIABILITY, VALIDITY & GENERALISABLITY

How as researchers do we ensure that our work is of sufficient quality, and that readers can rely upon the conclusions we draw? One way to do this is to consider the **'reliability'** of the research, which is concerned with how far the findings can be replicated if the study was to be repeated again (Lewis and Ritchie, 2003). The second is examining the **'internal validity'** of the research, in essence, whether the conclusions drawn from the research match 'reality' (Lewis and Ritchie, 2003; Merriam, 1998). The third **'generalisablity',** addresses issues of how far inferences can be made from the research (Merriam, 1998).

However, there are a number of questions marks of how far these terms can be applied to qualitative research as all three concepts depend on the ontological and epistemological stance of the researcher (Lewis and Ritchie, 2003). A constructivist will, for example, challenge the idea that there is a single reality - let alone that it can be captured through a process of **internal validity** however rigorous the research (Lincoln, 2002; Merriam, 1998.) As Merriam highlights "one of the assumptions underlying qualitative research is that reality is holistic, multidimensional and ever-changing; it is not a single, fixed, objective phenomenon waiting to be discovered" (1998 p. 202). Equally, issues of **reliability** are fraught with difficulties if the concern is whether a qualitative study can be replicated or not. For example, when gathering data through in-depth interviews there are many variables that can occur such as the "location and context, the physical and social space within which the interview takes place, power relations at the social and individual levels and a wide range of characteristics, predispositions, understandings and emotions" (Edwards and Holland, 2013, p. 92). Like the other concepts, **generalisability** has also been contested. As Merriam highlights "part of the problem lies with the common perception of generalisability derived from positivist-oriented research wherein one can generalise in a statistical sense from a random sample to a population" (2002 p. 28)

3 REFOCUSING THE LENS

While I too had issues with the concepts of reliability, validity and generalisability when framed from a positivistic perspective, the underlying intention of ensuring the quality of research is sound (Lewis and Ritchie, 2003; Snape and Spencer, 2003). Given this, I searched for other ways to ensure quality. For example, Crang and Cook point out that instead of considering whether a qualitative study can be repeated as if it was an experiment in a laboratory, researchers should instead offer **rich descriptions** of the context in which the findings were developed (2007, p. 147). As discussed in the last chapter, I embraced this approach.

Another strategy to improve the quality of research is to produce what some researchers have termed an **'audit trail':** "Just as an auditor authenticates the accounts of a business, independent readers can authenticate the findings of a study by following the trail of the researcher" (Merriam and Tisdell, 2015, p. 252). I too produced my own record of my research as highlighted in section 4.1 below.

Triangulating data too can offer a way of addressing validity issues. As Creswell explains: "When qualitative researchers locate evidence to document a code or theme in different sources of data, they are triangulating information and providing validity to their findings" (2013, p. 251). This was part of the approach I took to the NVIVO coding given I had over 50 interviews from 13 interviewees to draw upon. Thus a code was more likely to survive if it was populated by data from different interviewees rather than just one or two. Although I also had to be aware when individuals broke away from particular trends, for example one woman who defected during the establishing phase. However, as with the other concepts, triangulation too depends on the ontological and epistemological position of the researcher. I use triangulation to add depth and breadth to the research "through the use of multiple perspectives or different types of 'readings' "(Ritchie, 2003, p. 44). Ritchie adds "the 'security' that triangulation provides is through giving a fuller picture of phenomena, not necessarily a more certain one" (Ibid.).

There are numerous approaches that qualitative researchers use to address the issue of generalisablity. (Merriam, 1998). However, what was felt particularly relevant was the notion of "**empirical generalisation**". This approach is not about making inferences from a statistically derived sample about a wider population, but about giving rich details about a case study that could be used in other similar settings (Lewis and Ritchie, 2003, p. 277). Some scholars have referred to this in terms of a study's "**transferability"** (Lewis and Ritchie, 2003, p. 264):

> If one thinks of what can be learnt from an in-depth analysis of a particular situation or incident and how that knowledge can be transferred to another situation, generalisability in qualitative research becomes possible…The general lies in the particular; what we learn in a particular situation we can transfer to similar situations subsequently encountered (Merriam, 2002, p. 28)

3.1 Trustworthiness

Another way to understand issues of reliability, internal validity and generalisability is to frame the concepts in terms of **trustworthiness** (Lincoln, 1995; Merriam, 2002). As a qualitative researcher would I "trust myself in acting on their implications? More to the point, would I feel sufficiently secure about these findings to construct social policy or legislation based on them" (Guba and Lincoln, 2005, p. 205). Qualitative researchers do not rely on scientific instrumentation but on themselves as the "human as instrument", not only to collect the data but also to interpret and invariably present it as evidence (Lincoln and Guba, 1985, p. 985, Merriam, 2002). So given this, how do we develop trust in our research?

Lincoln (1995) argues that instead of upholding the notion of an objective researcher and the attainment of abstract, universal quality standards, qualitative researchers need to set themselves a different set of criteria by which to judge the trustworthiness of their research. Working within a paradigm where knowledge is socially constructed, such criteria should be fluid and not fixed, grounded in the context in which the study originated, and recognise that no research is ever neutral (Lincoln, 1995). Lincoln also argues that such standards need to evolve as the study itself unfolds, reflecting Connelly and Clandinin proposal that "each inquirer must search for, and defend, the criteria that best apply to his or her work" (1990, p. 7). For Smith (1993) a fundamental question needs to be addressed at the outset of this journey: "what we think research should do and be like" (cited in Lincoln, 1995, p. 275).

3.1.1 What research should do

To answer the first part of this question about what my research should do, I had to go back and remind myself why I wanted to carry out this study. What was I hoping to achieve with my research? Like many social scientists in recent years, the backdrop to my research was the unprecedented global challenge of climate change and the need to reduce carbon emissions. What particularly interested me, was how Social Practice Theory offered a radically different way to analyse this issue, rather than following prevailing policy discourses around behaviour change (Shove, 2010). However, as presented in the last two chapters, I also felt it was important to pursue a study that also highlighted the variations in performances and practitioners, and one that could throw light on social groups who may not end up on the winning side of a more sustainable society. To be serious about issues around

variance in social practices and diversity of practitioners, I felt it was important to also answer the second question posed by Smith (1993, cited in Lincoln, 1995, p. 275): what should a research study look like?

3.1.2 What research should be like

In recent years there have been increasing discussions around the methodological implications for SPT, such as Browne at al's (2015) work examining both practice-as-entities and practice-as-performances. In terms of the latter, scholars such as Hards (2011) and Greene and Westerhoff suggest the use of stories and narratives to "maintain a practice theoretical analytical lens while adopting a methodologically individualised approach to exploring the lived experiences and meanings of those who do the integrating" (2014, p. 11). Gram-Hanssen (2014) argues for more innovative methods such the use of video, to explore practices-as-performances through the lived experiences of practitioners . These are important contributions to the methodological debate around practices-as-performances, but when considering studies focusing on the issue of sustainability 'losers', I realised that I needed another level of reflection, given their potential vulnerable role within society. For example, questions arose such as whether innovative methods offer not just an insightful lens for social practice studies, but also suit the needs of the interviewees? Or what happens to the knowledge that has been co-created between interviewer and interviewee? Increasingly, I realised the importance of Clark and Sharf's assertion that interviewees needed to be central to the research vision, however academically challenging that might be at times:

> We choose to study what we think are important issues, things that matter to us and to others, and we want our work to make a difference in the lives of others and perhaps even to create social change in a particular arena... But our primary responsibility is always to our informants. We work hard to engage their informed consent to be part of our studies, and we're obligated to maintain an ongoing negotiation as the work unfolds. We are committed to give voice to their experience as fully and accurately as possible, and we make efforts to partner with them, in a meaningful way, in the construction of new understandings through our research. These are never easy goals to achieve, and ethical dilemmas often arise, dilemmas that often cannot be anticipated at the design stage (Clark and Sharf, 2007, p. 400).

3.2 Making a commitment

I would argue that responsibility to interviewees is even more important when working with social groups that could be considered disadvantaged in society. In my study the families were living on a social housing estate in one of the top ten percent most deprived areas in England (DCLG, 2015). This thinking, which evolved "indigenously as a natural consequence of the inquiry effort" (Lincoln, 1995, p. 286), made me realise that rather than limit myself to a set of criteria to just judge trustworthiness, I needed a much wider set of principles to underpin the research. Lincoln (1995)

uses the term 'commitments' to the research, and for her that included mutual learning by both the researcher and their respondents; the production of knowledge that is widely shared; and the promotion of social action as a result of the research inquiry. It also involved the dissolution of "the hard boundaries between rigour and ethics" that can be seen in some positivist research (Lincoln, 1995, p. 287).

For my own study, I had two main objectives for developing a set of commitments that underpinned the research. The first was to ensure that the research I produced would be seen as trustworthy by different audiences, including not only the academic and policy communities, but also "the community in which it was carried out" (Lincoln, 1995, p. 280). The second was to ensure that the interviewees in my study remained the priority - particularly given the context of their lives. Given these two objectives, I produced the following seven commitments to maintain a focus on trustworthiness and responsibility.

4 SEVEN RESEARCH COMMITMENTS

1 Sharing the journey

As highlighted above, the audit trail offers one way for qualitative researchers to make transparent how they reached their findings. Yet the audit trail is not without its critics amongst qualitative researchers who feel the concept is imbued with positivist values. For example, Adams St Pierre argues that qualitative research can rarely be pinned down to a neat, auditable trail, as she demonstrates in her discussions with doctoral students:

> I do...ask them to explain what they did when they thought they were 'doing analysis', and they describe a multitude of actions - washing the car and weeding the garden (the physicality of theorising), making charts and webs, talking with friends, writing, listening to music, reading transcripts, reading more theory, dozing on the couch, and so forth… audit trails can't capture that work… (Pierre, 2011).

Like Adams St Pierre (2011), I am also mindful that an audit trail does not necessarily capture the art of qualitative research. There is also a concern that while it can offer insights into how a study evolves, the method may also end up sanitising the research journey by tying up the loose and dead ends into a neat after-the-event narrative. And yet as Dey (1993) writes while "we cannot expect others to replicate our account', we can at least "explain how we arrived at the results" (cited in Merriam and Tisdell, 2015, p. 252). So my first commitment is in "sharing my journey", which is, in effect, an audit trail, but one that shares rather than hides from the "messiness of our methodological

dilemmas and choices" (Clark and Sharf, 2007, p. 414). Such a trail also offers insights, for myself as much as for others, as to what went wrong, as well as what went right:

> when you think that things are going 'wrong' with your research, they might be going 'right' if you think about them differently - as something that you can learn from and perhaps follow up...By design and by accident...there's much to learn if you tackle head on the 'fact' that your research is almost inevitably going to go, and going to be**, 'all over the place'** (Crang and Cook, 2007, p. 172 emphasis added).

The last chapter documented much of this journey - it highlighted key milestones from adopting a particular philosophy to writing up with thick descriptions. It showed how the research and the questions it was answering, iteratively developed as progressive focusing took place (Stake, 1995) and the journey unfolded. But it also started to share some of the wrong turns on the trail, for example the difficulty in pinning down analysis to a neat codeable software exercise. This chapter further develops an opportunity to reflect on my research journey. Indeed, at times I recognized that it was indeed, "all over the place" (Crang and Cook, 2007, p. 172), but also that "the entire journey 'counts,' not just the good parts…" (Ellingson, 2009, p. 177).

2 Self reflection

In order to share such a journey a degree of self-reflection is required, not only on what worked and what did not, but also the role a researcher plays in creating knowledge through their relationship with research participants.

> As human interaction and negotiation is seen as the basis for the creation and understanding of social life… it is the interaction of the participants in the interview situation - the researcher and the researched - that creates knowledge. The data in the form of talk that comprises the interview is regarded as a co-construction - what Kvale calls a literal inter-view (Edwards and Holland, 2013, p. 17)

Pink highlights "informants tell and show us what they do **because** they are in a research situation with us as individuals; this encounter and the knowledge produced through it can never be objective" (2006, p. 367). Self-reflexivity offers a way of exploring "our fieldwork relationships" (Ibid.) and how they have influenced the research, rather than sweeping it under the carpet of neutrality. My initial reflections at the outset of the study were around how I would be perceived by the families. I was concerned that I would be seen as a university researcher, who had been parachuted in to ask questions and then leave, with little appreciation of the context of their lives. So I worked at developing a rapport (Legard et al., 2003) with the families and, as the months passed, they increasingly shared more about their lives offering valuable insights into the context in which the Prosuming Project was evolving and their lived experiences.

In part, these positive relationships evolved due to my experience as a journalist of interviewing people from all walks of life. Yet the more interviews I conducted, the more I realised that this was not just about being good at getting on with people, but also being able to connect with the families on an emotional level. It dawned on me that I too knew what it was like to worry about not having enough money to keep the electricity on, or to scramble round to find some coins to credit the electricity meter. I knew, like a number of the families in the study, that my mother prioritised keeping our 50 pence meter topped up at the expense of other demands on a tight budget including food or heating. My childhood may have been an era before the proliferation of gadgets and screens but, like the families in the study, electricity was still at the heart of our life - the heating, the cooking, the washing, the lighting and running the only television sitting in the corner of our front room.

On occasions when the interviews took a particular turn, I shared this story with the participants. It was not a detailed conversation; I did not discuss what it felt like growing up as teenager in a household in fuel poverty. Given that a number of the households appeared to be in fuel poverty, and others vulnerable to it, such disclosure would have felt inappropriate and would potentially change the dynamics by putting the focus on me as the researcher. I was very aware and mindful of the need to maintain "the balance that keeps our informant at the centre of the conversation" (Clark and Sharf, 2007, p. 414).

However, by sharing the story of the 50pence meter, I demonstrated my empathy with their situation and signaled that I understood their emotional investment in the solar panels given the backdrop of a 'hungry' meter. As Davies and Dwyer highlight "research practice increasingly acknowledges the relational, emotional and affective dimensions to doing research in different settings" (2007, p. 258). I also hoped that it shifted some of the inherent power differences between a university researcher and families living in a low-income area (Kvale, 2008). Edwards and Holland highlight the issue of reciprocity within an interview setting "where researchers give back something of themselves to their participants" (2013, p. 19).

Yet while such self reflections offered a deeper level of engagement with the research and the respondents, I was also aware that it could also present difficulties as "familiarity can provide an 'illusion of sameness' (Hards, 2011, p. 147). I may have grown up with a prepayment meter but I was fortunate that as an adult I no longer had to worry about the electricity being cut off. It would be wrong to argue that I was an 'insider', given the opportunities I had as an adult that have far removed me from the world of fuel poverty. But I was also not entirely an 'outsider' as I could relate on an emotional level about the fear of running out of credit on the prepayment meter and being plunged into darkness (Gillies, 2004, pp. 15–18).

Instead, I was drawn to the concept of "betweenness" (Tooke, 2000 cited in Weller, 2004, p. 23). Weller used the term to describe how she was both connected in terms of her working class roots to the interviewees, at the same time as separated due to having moved away from the area many years before. She no longer shared the same "sociological niche" (Field, 2003, cited in Weller, 2004, p. 23). I too experienced such "betweenness": I could emotionally connect with the research participants given my background, but also recognise that my situation had dramatically changed from when I was growing up in a single parent family. It also made me alert to the importance of not being drawn into complacency during analysis; assuming I know exactly what the interviewees meant (Hards, 2011). Their stories and mine were very different - different time, different place and different lives; while I could empathise, my interpretations needed to be firmly grounded in the data I was collecting, alongside reflecting on the scholarly literature (Ibid.).

3 Embedding ethics

Guillemin and Gillam highlight the importance of acknowledging both "procedural ethics", that takes place through a university's ethics committee, but also "ethics in practice" (2004, p. 262). The latter invariably can throw up "ethically important moments' that often arise at unpredictable points along the research journey (Ibid.). Canella and Lincoln also argue that ethics should be "infused throughout inquiry" and that this demands "a continued moral dialogue" (2011, p. 81). As discussed in the last chapter, prior to carrying out any research I sought approval from the university's ethics committee for social science. And yet despite the thoroughness of the ethical review process, it was not long before I faced an ethical issue that I had not anticipated. In the first set of interviews I carried out, one of the questions I asked was how the families were going to get the best out of their forthcoming solar panels. In response, a number of them said they would use their appliances at night in order to benefit from the solar power. It was uncomfortable to hear this as, despite a face-to-face meeting with the solar installer, these household still had the wrong idea about how to access the solar power. It also left me with a difficult ethical decision. Should I intervene and share my knowledge of how to use the solar panels, or keep quiet? In particular, one of the interviewees regularly made 'heat or eat' type decisions and knowing how to use the free solar electricity could have a significant impact on the life of her family. However, by rushing and telling her how to benefit from the solar panels I would also be denying her the opportunity to work it out for herself, and any positive feeling that would come from that.

Guillemin and Gillam (2004) argue for the importance of reflexivity around ethical issues, but in the middle of the interview this was not easy; I had to make a decision there and then whether to intervene. Given this was my first "ethically important moment", I decided that I needed to consider

the issues away from the interview context (Guillemin and Gillam, 2004, p. 262). On reflection, my instinct had been to step in to try and remedy the misunderstanding. However, away from the heat of the moment, I realised that this could reinforce the power differences in my relationship with the research participants (Weller, 2004), by encouraging the idea that the researcher 'knows best'.

I decided, with the agreement of my supervisors, to step back and revisit the situation a few weeks later while undertaking the second set of interviews. To my relief, I discovered that all the households had worked out how to use the solar power. What is more, as I had anticipated, a number of them had felt proud of themselves for starting to save significant sums of money for the family from their use of solar power.

4 Confronting contamination

While the last commitment was concerned about ethics, it is also raises the issue of 'contamination' of research. In other words: "for accurate data to be obtained in an interview, and in the analysis, researchers need to be impartial and not **contaminate** an interviewee's report of their activities and experiences" (Edwards and Holland, 2013, p. 15 emphasis added). This is not Edwards and Holland's (2013) view but, as they highlight, it can emerge from a positivistic paradigm where the truth is out there to be discovered as long as it is not somehow compromised or distorted by poor research procedures.

The idea of 'contamination', does not sit well within a social constructivist paradigm that sees the researcher primarily as a 'traveller' creating knowledge alongside research participants, rather than 'mining' for it, to use Kvale's metaphor (2008). However, while Edwards and Holland highlight that the relationship between interviewer and interviewee is critical for knowledge creation, they also argue that this is not the only source as "interviewees can recount and convey to the researcher experiences and feelings that are part of their social world beyond the interview" (2013, p. 17).

The line between knowledge being generated due to the relationship between interviewer and interviewee, or as a result of the external world, is not clear cut and, as a novice academic researcher, I felt I needed to proceed with caution. I was only too aware of the criticisms that can be leveled at qualitative research, and case studies in particular, for their "lack of rigour in the collection, construction and analysis of the empirical materials" (Hamel, 1993 cited in Merriam, 1998, p. 43). To examine this more closely, I reflected on two women in the study and their relationship to the Prosuming Project and my role as a researcher.

The first was Val who in the first few months of receiving the solar panels, was generally enthusiastic about the Prosuming Project and the difference it had started to make to family life. However, because of personal issues, there was a gap of several months, spanning the winter, before I again interviewed her in the spring. When I spoke to her Val told me she had stopped prosuming over the winter and had only started again as the weather had improved. There was a similar story with Maggie. She too had started out enthusiastic, even persuading her husband to have the solar panels installed. However, she too lost her interest in prosuming over the winter although, unlike Val, she did not regain it during the research period and defected from the project. However, unlike Val, I saw Maggie on numerous occasions throughout the study period and across the winter. Additionally, both Val and Maggie were frank about their opinions about the solar panels and neither appeared to try to "make a positive impression or please the investigator" (Collins et al., 2005, p. 192). Maggie, was frequently critical of the programme, and Val also questioned it on a number of occasions as highlighted below:

> They give you solar panels instead of sorting out my windows which would benefit me through the wintertime because I wouldn't...be losing so much heat. So there's swings and roundabouts, and that's how people go and look at it.

Reviewing these relationships, and the paths these participants had followed, I was reassured that the relationship I had formed with these two woman did not appear to be influencing the Prosuming Project in their households. However, I was also aware that it would be surprising if my presence made no difference whatsoever. As, Barbara, another interviewee, said: "talking about anything more makes you more aware of it, doesn't it?" So given that I was talking to most of the families every few weeks or so, it would make sense that these conversations may have influenced their relationship with the Prosuming Project in some way.

However, I also realised that I was not the only person to potentially influence the findings. The study was not undertaken as an experiment in a laboratory, but within a small community of only several thousand households. As the month progressed, invariably a number of the research participants discovered by accident that they knew others who were also taking part in the study. As Barbara pointed out, the interviews were just one of a number of variables that could influence the Prosuming Project: "You don't know do you …[as] people's lives are different...It's like, you might be on night duty, or you might work days."

Any research - qualitative or quantitative - has the potential to unwittingly influence the outcome, however scrupulous the methods (Merriam, 1998). As Ratcliffe writes "one cannot observe or measure a phenomenon/event without changing it, even physics where reality is no longer considered

to be single-faceted" (Ratcliffe, 1983, cited in Merriam, 1998, p. 20). What is important, is being able to reflect on this and its meaning within the context of the research.

5 Questioning methods

As discussed in the last chapter, serial interviews were my preferred method given the potential to build a rapport over the ten months. The method seemed to have a number of positive benefits both for the study and the interviewees. It offered the chance for me, and the interviewees, to reflect on the issues raised by the interviews given they were usually a few weeks apart. The serial nature of them, also meant that the interviewees got used to the method and to me as the researcher, making it easier to have a "conversation with a purpose"(Webb and Webb, 1932, cited in Legard et al., 2003, p. 138) as discussed in Chapter 4. This was manifest in a number of thee interviewees sharing other aspects of their lives, which often turned out to have a bearing on the Prosuming Project, or at least relevant to the dominant, institutional projects discussed in the next chapter.

The downside to this method is that it was time intensive for the families, as it required meeting up several times over the year. Given this, I was as flexible as possible, meeting the interviewees at short notice and at times that were convenient for them (Bonevski et al., 2014) Occasionally, this meant I took a trip to the estate only to find the interviewee was no longer available, but it was more important that I fitted round their busy lives, rather than the other way round (Clark and Sharf, 2007). I was also mindful of how much time each session could potentially take, and tried to keep it to a minimum. In some cases it was better for the interviewees to have shorter and more frequent interviews, rather than a few longer ones. Overall I felt comfortable that interviewing as a method both met the needs of the families and the research. Again, as discussed in the last chapter, I ensured that the time they gave freely was appreciated and recognised by offering two gifts - a £30 voucher from the social housing landlord, and an iPad from the university. The households were particularly appreciative of the latter gift as generally it would not be something they would have purchased themselves, and was often relevant for the whole family.

However, at the outset of the research I had planned at least one additional method to complement the serial interviews. The main reason for this was to triangulate the interviews against a different method (Ritchie, 2003). I was drawn to the concept of a home energy walk, as pioneered by Pink. This had the benefit of being a method that was not just focused on talking about practices, but also seeing them acted out (Hitchings, 2012). Pink and Leder Mackley describe the aim of a video tour as "to move through the home... following and discussing with the participant and, in doing so, to learn about the ways in which the sensory aesthetic of home is created" (2012, p. 2). As they point out this

is about understanding "mundane but significant everyday moments, like going to bed, getting up in the morning, leaving and returning home. We focus on the bedtime routine, starting in the hallway." (Pink and Leder Mackley, 2012, p. 16). As highlighted in 3.1.2 above, Gram-Hanssen (2014) had also raised the potential for video to offer insights into lived experiences through practice-as-performances.

Pink and her colleagues as part of the Low Effort Energy Demand Reduction - LEEDR - project, have a website[3] dedicated to the use of sensory ethnography in understanding energy demand and everyday practices. It includes films of day-to-day activities and re-enactments of practices, as well as video energy walk of the home. Although there was only one of me, compared with a team working on the LEEDR project, I felt the home energy walk could be an interesting addition to my research.

Thus if the research participants were happy to host a tour, I planned that I would follow them around the house videoing their observations, for example pointing out electricity hotspots to me rather than just talking about them in the interviews. Or, as in the LEEDR project, reenacting particular practices. But as I got to know the families I increasingly realised this was a not a method I wanted to pursue. I started to pick up a few signals that a number of them would not feel comfortable with me walking round their homes as part of the research. In one case, I asked if it was possible to look inside a cupboard that housed the prepayment meter, but was politely told it was too full of clutter. In another, I asked to use the toilet, but was told that it would be difficult because the house was such a mess upstairs. On a different occasion, the interviewee asked if I could kindly use a different entrance to the one I normally used, to avoid bumping into a member of the family.

These occurrences were rare, given the dozens of occasions I was warmly welcomed into the homes of the families I was working with. But they were important in sensitising me to the fact that a home energy video tour may not be a method that was appropriate for some of the families. Looking at some of the videos in the LEEDR project, the homes generally seemed very different to the ones I was visiting. On reflection, if my project had been designed around the use of film as a key research method, then I may well have recruited people who were comfortable with this method. The downside to this is that it may have meant my sample was skewed towards people who had more tidy homes, or alternatively money to invest in them. Strengers (2009) noticed a tendency for research participants to tidy up the room they used for being interviewed in. So she only requested an energy walk at the start of the visit, to try and avoid the tidying up in other parts of the house:

[3] See http://leedr-project.co.uk/

> The impromptu tour therefore cause minor embarrassment and discomfort for most participants who were concerned about their 'messy' home. However, householders' uneasiness was normally short-lived when they saw that I was not concerned or bothered by the state of their home (Strengers, 2009, p. 75)

Another issue I realised for my study, was the longer it went on the more difficult it would be for the research participants to say no, because they had got to know me. On reflecting on these issues, I realised I had to question my reasons for wanting to include another research method within the study, particularly given the geographic area in which I was gathering the data. For example, I was already able to triangulate my findings across different interviewees. Additionally, I realised that given the length of the study, I was able to internally verify certain findings. For example, in terms of checking data, I regularly repeated the question about how much money the households were saving on their prepayment meters and their answer were remarkably consistent. In fact, the serial interviews meant I was amassing a vast amount of rich data from seven households over many months, and I realised I did not need another method. There was much more to be lost than gained from squeezing in a home energy walk on top of the series of interviews I was already undertaking, so I abandoned the idea.

6 Making a difference

Lincoln makes a distinction between scholars who see action arising from research as undermining rigour, and those who see it as integral to the inquiry process (2011). From the start of my research I gravitated towards the latter; at all costs I wanted to avoid producing a study that left the reader with a feeling of "so what?" (Flyvbjerg, 2006, p. 25). Turner suggests that research should be less concerned with the impossible endeavour of finding out the 'truth' and instead direct efforts towards its potential impact (2007 p 470). Liebenberg and Ungar's go so far as to assert that a "... critical component of the ethical conduct of researchers must therefore be the translation of findings into programmes and policies when appropriate" (2009, p. 18). Originally, I had discussed with the social housing landlord, who doubled up as the Local Authority, sharing relevant findings from the research with them once the PhD had been finished. However, it soon became apparent that this end date was too far in the future to be of use to the council, who was already planning the next solar PV rollout while my ten-month fieldwork was still ongoing. Initially, I felt reluctant to share my findings only a few months into my fieldwork. However, I was also aware of my responsibility to the families in the study who were keen for the findings to benefit others and was the main reason why they took part in the research. If I retained my original plan and waited until I had completed the fieldwork then my moment of influencing and potentially improving future solar PV programmes, may well have been lost. Instead, I took heed of Ellingson's advice to "be strategic; divide materials in ways that fit with opportunities to complete work in a timely manner" (2011, p. 604). Although I still had a lot more

interviews to undertake, I realised I had plenty of material I could feed back to the council, particularly around the initial installation period and the immediate months following this. They were, after all, interested in practical advice, rather than theoretical discussions.

So I reported my findings in a one to one meeting in November 2014 with a Local Authority officer who was responsible for the solar PV roll out progrmme. I explained that my findings so far were partial, as I had only completed around four months of the ten months fieldwork. Equally they were not a statistical sample of solar PV housing tenants on the estate. However, what they did offer was an insight into "a unique group of people at a specific moment in time"(Crang and Cook, 2007, p. 146). Given this context, the council could decide how far the findings could be transferred to a subsequent solar PV programme on the same estate (Merriam, 1998). In the end, the council officer found the findings insightful and took on a number of the suggestions, including producing a booklet on how to get the best out of the solar power. The booklet included direct quotes from the families in an attempt to at least try and include a more "bottom-up" perspective in the limited space available (Middlemiss and Gillard, 2015, p. 149).

However, there was a practical issue of how the booklet should be produced. Given I was familiar with the findings, I volunteered to draft the initial content, but on the proviso that it was first checked by the families so I could take on board their feedback for a final version. Although I would have preferred for the publication to be entirely co-created with them (Pink, 2012), they had given so much time to the research project I did not want to ask for more, so felt this was a reasonable compromise. Only one out of the seven households did not comment, as they were not available. The families were pleased that a publication was being produced and could see the benefits of it. They particularly liked the peer-to-peer focus that enabled their experiences to be shared. The main criticism was the use of a colloquial phrase that one interviewee said made them look 'common', so I removed it. Another remark concerned the length of the booklet, but others felt it was fine given the amount of information that they wanted to see it in.

There were many benefits to producing the 10 page booklet[4], not least that it enabled me to test out tentative interpretations and check their plausibility as another way of reinforcing trustworthiness of the research (Merriam, 1998). The booklet was also able to address a number of the issues that had

[4] I have not included a link to the booklet as it was produced in collaboration with the Local Authority and therefore includes their name and logo. As discussed in the Ethical Review section of Chapter 3 I decided, in the end, not to include the council's name is this thesis. While they were happy to have their name used in conjunction with the study, I decided on reflection to be extra cautious and remove it from the thesis given I was anonymising other data from the interviewees.

been raised by the families. For example, there had been concern from some about families about the lack of transparency around the scheme, and whether the Local Authority made a 'profit' from the solar power being generated by the households. The booklet addressed this directly:

> For this scheme, the council has paid for the panels upfront and will eventually be repaid through the Feed-in-Tariffs (FIT) - which is money paid by the government for every kilowatt of solar energy produce. It will take several years to recoup the cost, but where the council generates any extra money from the FIT, this will be used for energy efficiency work on council housing.

Like a pebble in a pond, the booklet created ripples way beyond what I had originally envisaged. The social housing landlord distributed it to several hundred solar PV households on the estate. It was also picked up by two other local authorities - one a county council - and used as a basis for developing a four page leaflet[5]. These other councils also took on several other ideas from the research finding of this study, including ensuring that the energy generation meter was accessible and not in the loft, as it was the case for the households taking part in my study.

7 Different genres

In order to produce a knowledge sharing booklet I had to engage differently with the data I was collecting, not least because I did not have the luxury of thousands of words available to me in a leaflet for the public. In addition, I had to think of the audiences I was trying to reach (Ellingson, 2009) who were much more likely to be interested in practical advice from prosumers, than the nuances of a three stage conceptual framework. In Ellingson's work on developing the concept of 'crystallisation ' as a qualitative methodology, she advocates drawing on different approaches and genres to offer a "wide angle view of the setting or phenomenon" (2011, p. 10). This includes creative representations to "make sense of your data through more than one way of knowing" (Ibid.).

The production of a booklet, was undertaken as a result of my commitment to sharing my findings more widely and offering something back to the community where the research originated. Yet the very production of it, also resulted in my thinking differently about the research, as Ellingson suggests:

> That is, as we gather, analyse, and represent data, we actively seek out possibilities for new directions…crystallization involves going beyond looking for connections between your emerging findings and others' research or adding a new theoretical perspective to illuminate unexpected ideas in your data. Rather, it necessitates a mind-set in which

[5] Similar to the booklet, I have not included a link to the leaflet as it was produced in collaboration with two local authorities and therefore includes their logos on it. My policy, in this thesis, has been to remove the names of the councils I have collaborated with, in keeping with anonymising the data from the interviewees. For further information see Chapter 4.

> researchers expect and invite radically different ways of knowing to shift their projects Ellingson, 2009, p. 127)

The booklet was designed around seven titles - in effect prosuming strategies - making energy, shifting energy, saving energy, reducing energy, storing energy, capturing energy and sharing energy. Primarily these titles were a communication tool for simplifying the Prosuming Project for a wider audience, but in drawing them up, I realised that alongside the evolution of prosuming a new project was emerging – the Shifting-Saving-Storing & Sharing Project - which is discussed in Chapter 9. Additionally, the seven titles of the booklet also helped me to start to see individual practitioners in a different way. They were emerging over the course of the study into different types of prosumers at different times, and eventually this helped my thinking into the development of a typology of prosuming practitoners discussed in Chapter 11. While these ideas had limited use in a public knowledge-sharing booklet, they were as helpful for the development of theory around project practitioners.

What also emerged from producing the booklet was a desire to work more creatively with the rich, material I had gathered. As so often happens in research (and life) serendipity stepped in (Liebenberg and Ungar, 2009; Sanders and Munford, 2009). A few months after producing the booklet, I was asked if I could make a short film based on my research for a public event looking at fuel poverty. This was a daunting prospect as I had no footage and a small budget but, on the plus side, I had many hours of audio recordings of the interviews. While the recordings were of a poor sound quality, the voices offered a different sensory experience of the vulnerable text I had included in my thesis. It is possible to hear the emotion in the voices of the interviewees when they were discussing their experiences of the Prosuming Project. It had a "capacity to move us and to evoke an emotional response" (Crang and Cook, 2007, pp. 76–77).

Having got permission from the interviewees to use their voices in a film, I had to be selective about what to focus on given that it was only going to be five minutes long and I had hours of recordings (Ellingson, 2011). Similar to Ellingson (2011), Pink argues that visual methods can offer the viewer different "ways of knowing that are based on ethnographers own experiences and the way these intersect with the persons, places and things encountered during the process" (2013, p. 35). As I explained above, my experience of fuel poverty was relevant here as I felt that a film could capture some of the lived experiences of a prepayment meter, and the difference the Prosuming Project can

make[6]. This reflects Ellingson's view that video can "provide rich views into worlds often marginalized in mainstream discourse" (2009, p. 68).

Given that most academic reports can only ever use a fraction of the rich data collected from qualitative research, crysallisation offers a pragmatic and strategic way of further using these findings for different audiences (Ellingson, 2011). Denzin and Ryan (2007) argue that if we are to authentically represent our interviewees we need different strategies including collaboration, sharing of lived experiences and personal narratives, and the opportunity to draw on different genres. I started out with a project that evolved from an initial collaboration with a social housing landlord, to one that involved seven families over four seasons. I sought to share their voices in this thesis through rich, thick descriptions but also felt compelled to go further through producing a booklet, leaflet and a film. Importantly, these other methods offered the opportunity to reach different audiences by connecting "hearts and minds, sparking compassion and inspiring people to change"(Ellingson, 2009, p. 62).

The booklet, leaflet and film are not part of the research methodology even though experimenting with different genres helped me provide new insights that fed into my analysis (Richardson and St Pierre, 2008, Ellingson, 2009). The engagement activities I undertook emerged because of wanting to make a difference - however small - and the responsibility I felt I had to my interviewees to share the findings as widely as possible given the time commitment they had given me. However, the desire to make a difference, as well as pursuing academic quality, is not mutually exclusive. I was fortunate that my research and engagement work gained academic recognition by being awarded the Sussex University Public Engagement Award 2016, as well as being a top three finalist for the national Engage awards. It made me realise that an academic audience was taking this work seriously, and that maybe my separate identities as a social scientist and communications professional could be merged within an academic research project - what Denzin and Ryan term 'civic sociology':

> Such a project characterises a whole new generation of qualitative researchers: educationalists, sociologists, political scientists, clinical practitioners in psychology and medicine, nurses, communication and media specialists, cultural studies workers, and a score of other disciplines. A detached social science frequently serves only those with the means, the social designation and the intellectual capital to keep themselves detached. We face a choice...of declaring ourselves committed to detachment or in solidarity with the human community (Denzin and Ryan, 2007, p. 591).

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[6] I have included a link to the film, as unlike the booklet, it does not name the Local Authority. https://www.youtube.com/watch?v=Ew1aYAzRIz0.

5 CONCLUDING SUMMARY

This chapter started out by problematising the concepts of validity, reliability and generalisability for qualitative research, particularly one that is underpinned by a social constructivist perspective. It highlighted that underlying the concepts should be the pursuit of quality research and ultimately the need to ensure it could be trusted. Critically, how comfortable did I feel that my research findings could potentially influence policy, or even more importantly be applied to a low-income community?

This was a pertinent question given the collaborative project that I had developed and the context in which it was carried out. I realised I had to think carefully not only about the trustworthiness of my work, but also the responsibility I had to the interviewees in the study. What emerged was different ways to approach validity, reliability and generalisability underpinned by a set of seven commitments that was inspired by the work of Lincoln (1995). By drawing up these commitments I had an opportunity to further reflect on my original research design and how far I had tailored it to the circumstances in which the data was being collected. In other words what were the methodological implications for carrying out a social practice study within an economically disadvantaged community.

The first of these commitments involved sharing the research journey - both what went right, as well as what went wrong. The second commitment looked at the value of self-reflection in research, by exploring my own experience of fuel poverty, and the importance of not assuming my story was the same as the families I was working with. The third commitment argued for embedding ethics throughout the research journey and the importance of recognising Guillemin and Gillam's (2004) 'ethically important moments'. In particular, I found that by not rushing to offer advice, the families had space to work out how to use the solar power themselves. The fourth commitment took this argument further by examining the issue of 'contamination' in research. It argued that any study can directly, or indirectly, influence the research, but what is important is being able to reflect on this and the relationships that have developed. The fifth commitment questioned the balance between the needs of the research study and the interviewees. When closely examined I realised I did not need a secondary research method, as serial interviews offered a wealth of rich data across many months and from different perspectives. The sixth commitment argued for the importance of not hiding behind the notion of neutrality, but to use research for social action, particularly given the context of gathering data from a low-income community. The final commitment was to draw on different genres to make research more accessible to wider audiences. Here I explored how producing such materials not only meant that my research reached new audiences, but also fed back into the academic analysis. Having examined issues of trust and responsibility within the research design, the next chapter, is the first of the four empirical chapters exploring life before the arrival of the solar panels.

PART 3

FINDINGS & DISCUSSION

CHAPTER 6

THE PROLOGUE:
LIFE BEFORE THE PROSUMING PROJECT

1 INTRODUCTION

The **last two chapters** explored the research design for this qualitative study. It included highlighting the importance of gaining an insight into the lived experiences of energy vulnerable households by, for example, offering rich descriptions of the context in which the study was generated. It also argued for the development of a set of commitments that made issues of trustworthiness and responsibility to interviewees more transparent.

This chapter will address the first subsidiary research question: "What are the key energy related practices and projects prior to the emergence of the Prosuming Project?" It will also contribute to the overarching research question "How and why does a 'Prosuming Project' evolve for social housing tenants?" The chapter evolved from the desire to answer the research questions by understanding the energy related lived experiences of the families before the arrival of the solar panels.

In more detail:

Section 2 gives more details about the seven families taking part in the study including what the core interviewees considered to be their electricity 'hotspots'. These included a range of social practices, although the most discussed was laundering. What was noteworthy, was how few households mentioned the tumble dryer as an energy hotspot even though it is one of the more energy intensive domestic appliances, and was used by all but one household, several times a week.

Section 3 examines the role of the project-practitioner in relation to institutional projects and the impact they make on their daily paths. In particular, two dominant, institutional projects are discussed: Feeding-the-Meter and Maintaining-Family-Routines.

Section 4 concludes the chapter.

2 PRACTITONERS & PRACTICES

2.1 Practitioners

The majority of the material presented here is from the first set of interviews, although occasionally it is drawn from later interviews if relevant to the themes discussed here. In the first interview with the families, prior to the solar installation, I was interested in finding out about domestic routines that might have a bearing on a future Prosuming Project. The households were asked to reflect on how electricity was used in the home, including areas that they deemed were particularly energy intensive and thus expensive to run. For short hand purposes I used the term electricity 'hot spots' with the interviewees. In other words, an activity or a place in the home they felt used a lot of electricity. Their reflections concentrated primarily on laundering (washing, drying and ironing) but also included, to some degree, cooking, lighting and ICT/TV activities. People rarely mentioned having a bath or heating the house as these practices relied on gas in their homes. Additionally, none of the households mentioned washing dishes as a hotspot, as only one household had a dishwasher and this was used rarely.

These findings are outlined in Table 5 below, along with some basic biographical details for each family[7]. For clarity purposes, I have identified each household by the name of the main interviewee who initially agreed to take part in the study. All seven of these interviewees continued as the main contact throughout the ten months. Although, as discussed in Chapter 4, I occasionally also interviewed other household members if they were present and wanted to talk about the solar power.

[7] As discussed in Chapter 4, names and some details have been changed to ensure anonymity.

Table 5 Summary of families and their electricity 'hotspots'

1 Irene's family Core interviewee: Irene 35 years old Additional interviewee: Tony 36 years old
Irene and Tony have four children aged between 4 and 15 years old. Both parents are often at home during the day due to childcare and periods of unemployment and childcare. Irene carries out all the laundering, cooking and cleaning in the house, while Tony undertakes household 'DIY' projects. **Electricity hotspots** For Irene, laundering practices are central to her weekly routines and she is strict about her children wearing clean school uniforms. She washes several loads at least every other day - similar to her mother when she was growing up. However, unlike her mother she also relies heavily on the tumble dryer for convenience, comfort (her children like the softness) and because of the unreliability of British weather. Irene is not happy to leave laundry to dry around her small house. It was not just cleanliness conventions that are non-negotiable for Irene, but also strict family routines inherited from her childhood. Her children eat and go to bed at the same time every weekday. Other energy demands that Irene and Tony spoke about was for lighting: they had invested in energy efficiency bulbs but it was difficult to get children to turn off lights. Leisure activities such as television and computing were also discussed but these were not generally contentious practices within the family, although Irene did limit screen time during the week. Irene was responsible for keeping the prepayment meter in credit - this was a particular strain on her and often required 'heat or eat' type decisions.
2 Frankie's family Core interviewee: Frankie 29 years old
Frankie and her husband Neil have three girls aged from 4 to 12 years old. During the day, if there is work, she has a part-time job, and combines this with looking after her youngest child who is not yet at school but attends nursery for some of the week. Neil works full time and Frankie carries out all the laundering, cooking and cleaning routines within the home, as well as ferrying children to various after school activities. **Electricity hotspots** Like Irene, Frankie has inherited strong cleanliness conventions from her mother and estimates that she can spend many hours a week carrying out laundering practices. Unlike Irene, Frankie emulated her mother when it came to line drying. While she still uses a tumble dryer once or twice a day for underwear and towels, the rest of the laundry will go on the washing line or be aired inside. Like many of the other households, routines are essential to their family life and Frankie is passionate about keeping to them, including across weekends and holidays. Frankie has energy efficient light bulbs and will turn lights off when not needed, but it is not an area of conflict in the family, nor is the use of televisions or computer screens. Frankie has the main responsibility for keeping the prepayment in credit, but often ends up relying on emergency credit.

3 Val's family

Core interviewee: Val 35 years old

Val is divorced and has two children aged 9 and 12 years old, one with a registered disability. Val is a full time carer and carries out all the household chores on her own.

Electricity 'hotspots'

Val stood out amongst the families for having to compromise cleanliness conventions because of lack of money. She could only afford to carry out a wash once or twice a week. Again, like many of the other families, Val prioritised clean school uniforms but because of the cost of running the washing machine she does her best to encourage her children to avoid getting them dirty. She too had strict meal and bed time routines for the family, and these were particularly important for her disabled daughter. The children's use of the television or computer games was closely monitored because of the impact on the prepayment meter. Lighting was also mentioned as an area of concern and, like other electrical appliances, was carefully monitored. Once the children were asleep, Val would often turn off all the lights and watch television in the dark to save electricity. In terms of drying clothes Val combined using the tumble dryer with air drying around the house as it is too difficult to use the washing line as her garden was not easily accessible. Val often has very little money left on the prepayment meter at the weekends, causing her to further curtail electricity use in the house, in addition to the regular trading off of one valued practice against another.

4 Barbara's family

Core interviewee: Barbara 49 years old

Barbara lives with her husband John and has a 15-year-old son. She works part time with regular hours each week. John is often at work, but with a zero hours contract can sometimes be at home. Barbara carries out all the cooking and the majority of laundering, although John also helps with domestic routines when he is around.

Electricity hotspots

For Barbara the heaviest demand for electricity was at night when all the family are at home. As Barbara's husband works in a manual job, his clothes need to be washed separately around three times a week. In total, she carries out one or two washes a day for the family although generally this is during the week rather than the weekend. She uses a tumble dryer mostly in the winter because she dislikes wet washing sitting around the house. However, in the summer, she tries to use the washing line if the weather is suitable to save on money, although she finds it not as convenient as a tumble dryer and it is not her preferred option. While the family routines had become more erratic since her child became older, they still often eat at the same time each evening. However, later on in the evening they may end up sitting in different rooms to watch a television programme. Barbara also talked about the issue of lighting and the difficulty in persuading her son to turn lights off after use, but like the other households, this was not an area of conflict in the household. Barbara tried to keep to her electricity budget to ensure she did not run out of power, but sometimes this required cutting back on food costs.

5 Maggie's household

Core interviewee: Maggie 29 years old
Additional interviewee: Harry 32 years old

Maggie and Harry live together and have a ten-year-old daughter who has a registered disability. Maggie does not work outside the home and Harry has a part-time job. They share the laundering and cleaning of the house, while Maggie carries out most of the cooking.

Electricity hotspots

Strong cleanliness conventions were also in evidence in Maggie's household. Like the other families in the study, washing was a key practice that could involve up to three loads a day. Like a number of the other households, Maggie does not like the clothes being left to dry in the house and also tends to use the tumble dryer because of the British weather. Routines too are important to Maggie and she tries to keep to eating at the same time each day for her daughter. Issues around energy use are not a huge source of tension in the household, although Maggie would like her daughter and partner to be more mindful of not wasting it. She is also generally responsible for keeping the meter in credit as she is around more during the day more than Harry. In the past when they had less money, they once found themselves without any electricity for several days.

6 Zoe's family
Core interviewee: Zoe 42 years old,
Additional interviewees: Will 45 years old, Tracey 19 years old and Ben 19

The couple have three children 15, 17 and 19 years old. Zoe works part time and her shifts vary each week. Will but does not live in the family home. Zoe carries out the majority of household chores but does have help from her children. Her oldest daughter shares a lot of the laundering.

Electricity hotspots
Like most of the other families in the study, the washing machine and the tumble dryer were central to the domestic chores. It is not uncommon for up to four loads of washing to be carried out in a day all of which is then tumble dried in the machine as there is no washing line in their garden. Unlike the other households in the study, cooking and eating practices were much more erratic as the teenagers were rarely at home at the same time in the evening. Teenagers were also seen as wasteful of electricity but, similar to the other households, there was still little tension around this. Zoe was fairly resigned to the situation. She hated the idea of running out of electricity and whenever she could she topped up her prepayment meter with any spare cash. However, energy costs were expensive and Zoe often had to cut back on her food budget, during the week before she got paid.

7 Ed's Household
Core interviewee: Ed 54 years old
Additional interviewee: Jane 55 years old

The couple have four children, with the youngest two, aged 14 and 19 still at home. Ed works full time with night shifts and Jane has two part-time jobs and often also works shifts. They both share the laundry, cooking and cleaning activities.

Electricity 'hotspots'
Even though Ed and Jane have changing work shifts they try, where possible, to keep to a steady routine for their youngest child who has a disability. This involves eating at a regular time each day as much as possible. Ed grew up in fuel poverty and is particularly concerned not to waste it. The family are modest in their use of electricity and appeared to have less laundry than the other families in the study apart from when their oldest son and his children came to stay over the summer. They do not have a tumble dryer: in the winter they rely on using their radiators to dry clothes and in the summer the washing line. As a result, Ed keeps a close eye on the weather forecasts so he can try and synchronise their washing to the best drying conditions. The family try to be careful with electricity and there are generally no tensions in the household because of it. Like Zoe, Ed tried to keep his prepayment topped up to avoid running out. He would have liked to change his tariff to direct debit but found the electricity company not helpful so he remained on a prepayment tariff throughout the research.

2.2 Practices

There were a number of social practices that emerged from the interviews as especially significant in terms of the consumption of electricity in their homes. These included washing, drying and ironing ('laundering'), cooking and lighting. In addition, there was another grouping around laptops, television and mobile phones that Nicholls and Strengers' term "education, socialising and entertainment" (2015 p117). Additionally, lighting practices were mentioned almost exclusively in relation to children.

2.2.1 Laundering practices

Washing

Most of the households cited washing as a key domestic practice that uses electricity. Frequency varied significantly from a couple of times a week to four times a day, although most were closer to the latter than the former. As Frankie said:

> I can do anything up to five loads a day with these kids, yeah. They come home with a dirty school uniform and they go and play out. They come in filthy, they have to get changed again, and then they're in the bath and that comes off and then they're in their pyjamas you know, so it's just constant.

But frequency was not the only variable across the households; each had developed their own set of elements for the practice of washing (Hui and Spurling, 2013). For example, a number of the households had clear family rules about cleanliness that impacted on the meaning element of laundering. Thus for Frankie, as long as her children left the house in clean clothing it did not matter if they got them dirty at the park or at school. They could be dirty all day as long as they did not leave the house in this state. Meanwhile, Irene would allow her children to leave the home in clothes that were not 'clean' but only if they were going to a park and not out on a family visit. Maggie was fine with her daughter going to school in uniforms that had stains on them, as long as they had been freshly laundered. As she says: "I wash all her clothes and they are still covered in stains, and they are still looking dirty going to school, but I know that they are clean."

To add to these different washing conventions, there were others that relied on sensory cues. Thus Barbara would wash her son's school shirts after use, but occasionally would skip one if it looked and smelt right to her. She explained: "His t-shirts ... can sometimes go two days, but sometimes not, and he has only got two to juggle." For Zoe it was more confusing, her teenagers left both clean and dirty clothes on the floor. This reflects previous ethnographic research into laundering. Pink wrote "once clothes had left the wardrobe, the only way back was through the washing machine, even when the clothes had not been worn" (Pink, 2012, p. 75). Zoe tried to keep on top of the ever growing mountain of washing by carrying out a 'sniff test' for either laundry liquid or body odour to decide what item of clothing should end up in the washing basket. Again this reflects previous ethnographic studies:

> Doing the laundry is one of the skilled multi-sensory practices of everyday life. It involved embodied knowing, sensing, ways of doing that are rarely articulated verbally, but that are essential to the successful accomplishment of its various stages (Pink and Leder Mackley, 2012, pp. 70–71).

For a number of the households their role as a practitioner appears directly related to how their mother viewed cleanliness and washing. For example, Frankie says: "My Mum obviously was the only one who did any washing and housework...There was always washing at my Mum's house. Always two washing lines for the washing." Maller and Strengers terms this "practice memories" as it "implies the embodiment of a practice; a record or trace of its history preserved and reproduced through the bodies which carry it" (2013, p. 245). They highlight how such memories are not just "muscle memories" (2013, p. 244) embedded into the body of the practitioner, but also offer an insight into a social world of circulating elements that make up past, present and future practices:

> … as practices are by nature social and hence shared, memories are also shared and emerge from a collective of performers undertaking the practice (Maller and Strengers, 2013, p. 244).

Cowan's (1983) book on the history of domestic technologies and women's work, highlights such intersections between personal stories and socially shared meanings. Below she reflects on her own view of laundering and how these are not just personal conventions but have evolved over decades:

> The fact of the matter is that I cannot stand the sight of my children in dirty clothes. I associate dirt with poverty, with loss of control; and like a somnambulist, I am walking through the rituals and responding to the symbols that really meant something seventy years ago (Cowan, 1983, p. 218).

This reflects Shove's point of the "social value of cleanliness" (2003b, p. 120) that circulates across time and space and still has power to influence the practice of laundering today. For some of the households in my study this social value operated differently behind closed doors: pyjamas worn during the day and the visual checking and sniffing of clothes were all attempts to reduce the laundry burden both washing and drying (Pink, 2012).

Drying

Out of seven households, only Ed's household did not have a tumble dryer. Instead the family used radiators and whenever possible the washing line. As a result Ed had become adept at 'reading' the weather in order to fit the washing and drying around varying work shifts and suitable drying conditions. But across all the other households, tumble dryers were fairly central to drying practices even though some air-dried their laundry either in or outside the house depending on the weather.

A tumble dryer is one of the most expensive appliances to run in a house ("Household Energy Consumption," n.d.), but only two of the households specifically highlighted it as an energy hotspot. In addition, its running cost was barely mentioned in the first interviews despite all the households relying on prepayment meters. Instead for all the households with a tumble dryer, it was regarded as

an important material element in the social practice of laundering. For some, the tumble dryer offered a temporal bounding of the laundering practice. For example, it enabled a practitioner to be able to work out exactly how long it would take to dry a pile of washing; often necessary given the strict family rules around cleanliness and clothing. A tumble dryer also offered the certainty that a dirty school uniform could be washed, dried and ready to be worn by the next day. Such a material element can be helpful for "family peak" times - for example between 4pm and 8pm - to enable households to juggle different practices (Nicholls and Strengers, 2015, p. 116). As it is much quicker to load a tumble dryer than peg out washing on a line, the time saved could be used to start cooking the children's tea.

Additionally, all the families lived in modest, terraced social housing. There was no separate utility room as might be seen in an affluent neighbourhood that could offer a space dedicated to air drying as an alternative to the tumble dryer. And yet, despite this, Frankie had created her own drying spaces inside the house using clothes airers and radiators, as well as a "very hot water pipe [that] runs all the way along my hallway so it's perfect to hang all my coat hangers on." Her embodied knowledge of laundering over many years enabled her to juggle the different drying methods depending on urgency and weather.

However, for most of the households they not only liked the tumble dryer because it offered temporal certainty but also spatial containment. Pink talks about the various laundry flows or "lines" around the house and how it is "part of the ecology of things that make the textures, smells and visual appearance of home" (Pink, 2012, p. 76). While Frankie welcomed the display of wet clothing, perhaps because it offered her visual evidence of the skill of her laundering performance, for others it jarred with their aesthetic sense of what their home should look or smell like.

But the use of the tumble dryer also offered an important sensory quality to many of the families (Pink, 2012). Drying clothes on the line resulted in stiffness rather than a softness that came with tumble drying. Children too had grown up with a particular texture to their clothes and some were quick to complain if it felt different. For Irene it helped to justify why she used a tumble dryer rather than the washing line as her mother did. . As she said, "the middle age seven year old...has [eczema] quite bad on her arms. She is quite the drama queen ... if it's not soft on her skin."

Ironing

While drying follows washing, ironing did not necessarily end this group of practices. Barbara and Jane were the only two people that regularly ironed. In the rest of the households, the activity was much more sporadic as it appeared that ironing did not have the same social conventions as washing

did. As Frankie said: "I don't really iron, I just wash, hang it up. If it needs ironing when they go to wear it, I'll iron it then. And if the creases have dropped out it's a bonus!"

Not only were a number of households leaving the ironing to see if creases fell out, no doubt aided by crease-resistant fabrics, they were also adding a new material element to the practice - the tumble dryer. As Zoe explained "If you tumble it and get it out fast enough you can fold it up and it doesn't need ironing." She had even developed a system for clothes that were already hanging in the wardrobe: "If it's creased, chuck it into the tumble dryer with a wet tea towel... Give it a shake and put it on a hanger.... It's fine nine times out of ten." However, while ironing, in the traditional sense, seemed to be a discretionary practice compared with washing and drying, cooking was not.

2.2.2 Cooking practices

Despite cooking - whether from fresh or a ready-made meal – being such an everyday domestic practice for families (Nicholls and Strengers, 2015) only two households mentioned it as an energy hotspot. Val highlighted how she liked to use two ovens when cooking a Sunday roast dinner but that meant she did not have enough money on her electricity to also use the washing machine.

> When my partner, their dad, was here, my washing machine would be going and I'd be cooking a roast dinner on a Sunday. Well, when he left that stopped...'Cos it would cost way too much money. So it would be like one or the other basically, I couldn't do both.

For Zoe, cooking as a domestic practice was an energy hotspot because of the frequent use of the cooker, as teenagers came and went at different times:

> Ben: We don't so much have big family meals. We all just cook whatever.
>
> Will: Because at moment they are all old enough. Daughter comes in when she wants...They tried doing the old 5:30 to 6pm (meals), maybe 6:30 but then it depends on what kids are in.

Instead, Zoe had developed a system to ensure there was food in the freezer or fridge that her children could help themselves to. This included home cooked food, but also convenience items such as pizzas. However, for the rest of the families in the study, including those with younger teenagers, it was important for them to keep to regular meal times. For those with special needs it was absolutely essential to retain this routine as Val explains:

> I have to live by routine because of my daughter and her special needs. Everything is a routine. I can't just go right, 'We are not going to have dinner until 7 o'clock at night'. It will be like, 'What?' No, they wouldn't cope with that. It's routine all the way for us.

Cooking and eating meals at regular times also needed to fit round the rest of the age-related activities that children carried out after school, including sport, play, homework, bath time and bed. It was not uncommon for two evening meals to be cooked - one for adults and one for children - particularly when there were younger children.

2.2.3 ICT practices

In their study of peak energy demand in households with children, Nicholls and Strengers found that ICT practices that cover socialising, education and entertainment were highly flexible (2015, p. 17). Teenagers easily go from using a smart phone for Instagram to watching a film on a tablet, or playing a computer game on the television. Indeed such practices had also "colonised almost all times of the day" (Nicholls and Strengers, 2015, p. 120) and yet unlike the Australian study, most of the parents in this UK study were not overly concerned by this. In many ways there seemed to be an unspoken family contract that, like getting clothes dirty, young people also used information communication technologies as a key material element in socialising and entertainment practices. It was not seen as an energy hotspot. However, as this was not a direct focus of the study, there may well have been concerns that were not voiced.

2.2.4 Lighting practice

However what did emerge from the findings was that parents felt that lighting was an energy hotspot, but like ICT related practices, it was not a big area of concern. Again, the feeling was that while children undoubtedly left lights and electrical gadgets running - this was almost expected of them. As Barbara explained in jest, her house often looked like "Blackpool illuminations - they don't care kids, they haven't got a clue!".

3 FAMILY PROJECTS

The first set of interviews with the households highlighted just how far electricity is deeply embedded in the daily lives and social practices of the families. The cooking of the children's meals; the filling of the washing machine with school uniforms; the 'ironing' of the clothes through a quick blast in the tumble dryer; or the scanning of the internet through a tablet. Households did not buy 'energy' per se but the services that it provides:

> We all pay energy bills and we understand that energy is delivered through wires and pipes into boilers, TVs, kettles and so forth. However, it is not the energy, as such, that consumer's value. In paying energy bills, people are really paying for the services that energy makes possible: for thermal comfort, for entertainment or for a cooked meal, it is the ability to watch a favourite TV soap (while consuming a favourite TV dinner) and the coziness of the home that matters (Shove et al., 2015, p. 2).

But while family life may have been built around a series of energy-intensive social practices, what also emerged from the study was the role of projects. They were instrumental in helping to manage the demands of daily life through mobilising elements and orchestrating social practices to the fulfilment of different projects. In turn, these projects helped to shape the daily and life paths of different household members (Pred, 1981).

As trust built over the course of ten months of research, the interviewees shared different aspects of their lives that invariably included a range of projects they were involved in: some pleasant, others mundane, many challenging. For example, a one-off project for Maggie was a party for her daughter that included finding a venue, sending out invitations and preparing food for the occasion. For Irene and Tony, an on-going project was making the family home cosy and comfortable, despite having very little money to spend on this. For a couple of the families a complex project was finding suitable schools for their children given their learning difficulties.

What emerged from the interviews over the course of the ten months were the many projects that the households undertook - from searching for a job to updating the kitchen. However, two emerged that were directly relevant to energy demand in the home: 'feeding' the meter; and the importance of maintaining family routines. But why were these two activities projects? Chapter 3 discussed three features of a project. Firstly, whether a practitioner could make sense of it (Christensen and Røpke 2005); secondly the mobilisation of elements (Shove et al); and thirdly, the orchestration by practitioners of social practices (Watson and Shove). The end result is the integration of elements and social practices into a project-as-performance.

3.1 Feeding-the-Meter Project

3.1.1 Making sense

As discussed earlier, electricity was deeply embedded in the daily routines of family life. But what also emerged from the research, prior to and post installation of solar panels, was the central role of the prepayment meter in ensuring these valued social practices were delivered. Despite the association of prepayment meters with low incomes (Cooper, 2014), the payment method attracts some of the most expensive electricity tariffs in the UK (Ofgem, 2015, p. 15) - an irony not lost on the families. Yet

despite this situation, most of them would not consider any other method of payment because it enabled them to keep a close watch on their electricity costs to ensure they had enough for valued social practices. As Frankie explained, the reason why she has a prepayment meter is so she does not "get stung with the bill after three months." She added:

> I know where I stand, it's just, I pay my bills every, you know, I pay my gas, my electric, my rent, my TV licence, all on the same day and it's done for that week...We just live week by week, rather than like monthly, or quarterly. It is more expensive, but we know where we stand with it. And we're not left owing any bills.

Val also made the same arguments: "I would never go quarterly, never! I'd rather pay the extra, I'd be pre-payment ...all day long, because I know where I am...but I have to pay extra to have that privilege." However, a common theme that emerged from the research was the importance of keeping the prepayment meter 'fed' so a household would not run out of electricity. As Barbara highlighted:

> You are constantly checking the meter...So you check it and think okay, I've got a fiver on there now and you know roughly how long that is going to last you...It makes you more aware because you have to **keep feeding it all the time** (emphasis added).

While Barbara was the only interviewee who used the term 'feeding' the meter, many of them were well aware of the constant need to ensure they had enough credit on their prepayment meters so electricity did not run out at inopportune moments. And behind this constant checking was an underlying stress that many of the families felt. I have no doubt that a Feeding-the-Meter Project would make sense to all the households in the study.

3.1.2 Mobilising elements

In order to perform the Feeding-the-Meter Project, practitioners had to first mobilise a set of elements. In terms of the **meaning element**, the project was associated with being careful with energy, what Jenkins et al term "energy frugality"(2011, p. 21). Their in-depth study of fuel poverty and carbon emissions in seven households highlighted how central frugality was to managing energy resources - both electricity and gas.

> One of the most noticeable characteristics of the households visited was their frugality. While the respondents reported a variety of monthly income levels and energy costs, all took some measures to reduce their energy use by being frugal with these resources….(Jenkins et al., 2011, p. 21).

But frugality was not the only meaning of the Feeding-the-Meter Project, as it was also associated with the smooth running of the home through a series of practices including cooking, cleaning, and even computer gaming. The key **material element** for the project was the prepayment meter itself. While many of the households used the meter to avoid having to face large quarterly bills through direct

debit billing, it was also used by many of the households to ensure they did not run out of electricity at key times – for example during 'family peak' periods (Nicholls and Strengers, 2015). The meter also helped to make energy more visible to the households. As Val highlighted the physicality of servicing the "key meter" was an important way of materialising energy and its connections to daily life:

> Well if you are on a quarterly bill and you don't have a key meter, it is just there. So no one thinks 'Oh well, I've got to be careful here'. It never gets cut off. It is always coming in to your house. Whereas on a key meter, you know, you've got to physically take the key out to go and physically top up or if you don't you have no electric in your house. It is totally cut off.

The prepayment meter was not the only material element associated with the project. For example, the use of energy efficient light bulbs was another approach that was taken by some of the households to reduce the demand on prepayment meter. However, access to energy efficient appliances such as washing machines or cookers were generally limited because of the cost involved. Many families relied on second-hand goods that invariably were not highly rated for energy efficiency. This reflects the findings from other research including from Jamasb and Meier (2011)and Boardman:

> At the moment, few low-income households benefit from the minimum performance standards being introduced for new equipment, as over half of them may buy second-hand appliances and those that are new are focused on low capital cost items. (Boardman, 2013, p. 120)

Finally, the practitioners also drew on a range of **competence elements** to help them fulfil the project. In particular, their knowledge around feeding the meter had become embodied by combining both mental agility to work out how much electricity was needed for particular practices, as well as the physical demand of having to leave the house in order to ensure electricity is maintained. As Val explained:

> For us, we do see it, we do feel it, because we physically have to do something about it, whereas if you are on a quarterly bill you don't, [the electrics] just there. It's like: 'I'll just leave the TV on all night, I can just put the tumble dryer on all day'. It don't matter... But I always had to check ... 'Are we alright? Yep', 'Can we go another couple of days before I have to top up?'. 'Right I'll put this money by for that, then that's fine...'.

3.1.3 Orchestrating practices

In addition to mobilising elements, households also needed to orchestrate a series of social practices to the fulfilment of the Feeding-the-Meter Project. This often required changing the elements of these practices. For example, Val changed the meaning element for her home-based leisure practices: pyjamas were no longer just for bedtime but were essential to 'chilling out' at home. This reduced the number of washes she did each week to support the fulfilment of the Feeding-the-Meter Project:

> [After] ...school I would go to the park for an hour or so and by the time we get back it's like five o'clock…They ...[ask] 'Can we put our pyjamas on?' 'Yeah 'course you can'. For them it's comfort ... So the only time they are wearing their outdoors clothes is during the holidays and that's when I do more washing.

For Zoe, in the week prior to getting paid, she had to adapt washing practices to ensure the prepayment meter stayed in credit. As she explained: "I'll probably do less washing that week. Especially if I know that there's only £15 left on the electric, I'll try and sort of like wait until I've got the money." She also adapted her cooking practices to accommodate the Feeding-the-Meter Project: "it's mainly…cutting down on the food on the last week, well sort of being using up the cupboard stuff."

3.2 Maintaining-Family-Routines Project

3.2.1 Making sense

Along with feeding the meter, another theme that emerged strongly from all the households was the importance of routines to family life. What initially alerted me to this potential project was a couple of papers that explored practices and routines in family life. Christensen and Røpke, in their study of energy demand within seven households, saw parents constantly juggling a set of practices, including shopping, cooking and communicating in the pursuit of "holding things together" for the family (2005, p. 7). The paper deliberates whether 'holding things together' could be considered a social practice although they also argued that it could be seen as an "abstract (cultural) concept that people use to interpret a diversity of activities and actions related to different practices" (Christensen and Røpke, 2005, p. 17). I would argue that it has the features of a project as a "number of actions and routinised activities are related to parents' daily struggle to 'stay on top of things' "(Christensen and Røpke, 2005, p. 11). In other words a 'Holding-it-Together' Project.

Another paper that also offered an insight into what I was seeing in my data, was the notion of 'family peaks' that are based around a bundle of practices developed in response to a range of institutional pressures including work, school and the family itself (Nicholls and Strengers, 2015). The authors argue that the practices constituted a 'complex' because they are glued together "practically, emotionally or mentally" particularly around peak periods (Nicholls and Strengers, 2015, p. 118). They write:

> We find a clear rhythm to the day (morning routine, family peak and evening downtown), and to the family peak period itself ...which are synchronised around institutionally-timed childcare, school and work arrangements, and around the 'kid rhythms' which orient family life (Nicholls and Strengers, 2015, p. 122).

Certain practices "congeal" during peak periods not only because of a physical presence but also because of the emotional engagement - sitting down and sharing a family meal can offer both (Ibid.). Nicholls and Strengers' (2015) paper resonated more closely with my findings, although again, I would argue that these bundle of practices could be seen in terms of a 'Family-Peak Project'.

But, I would argue that neither potential projects - Holding-it-Together or Family-Peaks tell the full story of what I was seeing in my data. Firstly, routines were seen in a much more positive light than 'Holding-it-Together' suggests. Secondly, routines shaped family life going beyond just responding to busy times of day. Instead, I would argue from the data that a 'Maintaining-Family-Routines Project' would make sense to the households in the study. As Frankie said, "I do kind of the same thing every single day and that's the way it goes. It just works".

3.2.2 Mobilising elements

The second feature for a project - the mobilising of elements was also in evidence. In terms of the **meaning** element Maintaining-Family-Routines was about the smooth running of the home as Frankie explains:

> Yeah well, the oven goes on literally the same time every day…by about half four, five o'clock and then, it heats up and then the dinner goes in, they have their dinner and their bath. Sometimes have a little bit of iPad time. Well, my youngest one does, he's in bed by seven. The second is a little bit later and the oldest is in by half eight, nine.

But the meaning of the project was also about doing the right thing as a parent. The experience that routines support good parenting is beyond the scope of this thesis, however one paper that reviewed 50 years of research into "naturally occurring routines and rituals" had some interesting observations about these issues (Fiese et al., 2002, p. 381). Their literature review of 32 publications highlighted that a number of studies found that "during infancy and preschool, children are healthier, and their behaviour is better regulated when there are predictable routines in the family." They added: "not surprisingly, a healthy child also makes parents feel more competent, which is also related to regularity of routines" (Fiese et al., 2002, p. 385).

Secondly, the practitioners drew on a range of **material** elements for the project from cookers to provide hot meals, to hot water boilers to ensure baths for their children. But one material element in particular stood out for the Maintaining-Family-Routines Project. As discussed above, the tumble dryer was seen by many of the households as central to their laundry practices. For example, it enabled practitioners to be able to turn dirty school uniforms into clean ones within a 24-hour cycle - particularly important for families who could not afford spare sets. But the tumble dryer not only

helped meet institutional demands for children to turn up to school on time and in clean clothes, but also addressed some personal concerns of parents as Irene explained:

> Bullying is a major thing so if my daughter was to come home with dinner down her jumper it would have to be washed, you couldn't go to school with it obviously because people would just start on her.

Finally, the practitioners also drew on a range of **competences** to help them fulfil the project. For example, Ed and his wife introduced clear rules that Sundays were set aside for church and the family. No chores took place on this day, apart from cooking a large meal for which extended family were invited. It was an important time in a busy week not only for praying but also catching up with family. For Barbara, part of her weekly routine was to cook at the same time each day, so there was at least the potential for the family to sit down and eat together, even if it did not happen every night. For Val, and a number of other families whose children had disabilities, it was about setting clear boundaries to support their children's development and improve their wellbeing.

Nicholls and Strengers study highlighted how routines helped families address disruption and provide "a sense of normality to which everyday activity can return" (2015, p. 123). Val's family life is a good example of this. She knew that at least twice a month she would have very little money in her purse at the weekend. So part of her Maintaining-Family Routines Project was to plan ahead and ensure she had stockpiled enough basic provisions for the weekend, plus money on her electricity meter to avoid being cut off. Alongside this, she kept up her normal routines for her children including going to the park and eating their meals at the same time, so that disruption was minimised.

3.2.3 Orchestrating practices

Practitioners also orchestrated various social practices to fit with the Maintaining-Family-Routines Project. As Irene highlighted:

> [there are] routines for bed times, bath times, and everything else… I mean my oldest child has his computer time, he's only allowed two hours a day. The middle one likes to watch a film when she goes to bed, again at a certain time…so yeah, our routine is between the hours of 4pm and 8pm is quite busy and a lot [of electricity] gets used.

Even Zoe performed the Maintaining-Family-Routines Project despite having children in the mid to late teens, it just looked different from families with younger children. She explained that as her children had grown older, routines had started to relax, for example, eating as a family was now quite rare. However, she still kept a close eye on her family and found ways to introduce new routines that accommodated their different timetables. Thus, for example, Zoe ensured that she had cooked meals that could be kept in the fridge and reheated at different time of the day or night. The new routines

not only had to fit round her children, but also her changing weekly shift patterns. The result was that the family routines were much less prescriptive and more flexible compared with when her children were much younger.

3.3 Meeting institutional and individual needs

Central to both Social Practice Theory and Time Geography is the understanding that society is reproduced through social practices:

> If society is viewed in this manner, then the reproduction of society may be defined as that constantly ongoing process whereby, in a given area, the everyday performance of institutional activities (including eating, cleaning, and other mundane practices associated with the institution of the family) results in the perpetuation, in stable or altered form, of: the institutions themselves; the knowledge necessary to repeat or create activities; and already existing structural relationships; as well as biological reproduction of the area's population (Pred, 1981a, p. 6).

Such activities become bundled together into projects to be performed through the daily and life paths of individuals. And yet society is more than the sum of its institutional parts – it also includes activities and projects that emanate from individuals. This is particularly the case for the family that has a dual role as both an institution and "an emotional and psychological unit"(Pred, 1981b, p. 6). Individuals find "participation in family projects must be juxtaposed with the time-geographic requirements and constraints of other organizationally or institutionally defined projects" (Ibid). As demonstrated in this study, this involved the daily performances of cooking and washing - servicing the family as an institution - alongside other projects emanating from individual family members that invariably fought for space in daily and life paths. Frankie explained in one interview how she juggled a family institutional project - getting children fed - alongside an individual project of keeping up with favourite television programmes.

> I make sure I watch my soaps. But I'll be cooking our dinner, watching the soaps, you know, running in and out of the kitchen, miss half of the soaps anyway, most nights whether I'm dishing up dinner or, or whatever, and then, I will, if there's a load of washing there it gets thrown on.

Both Feeding-the-Meter and Maintaining-Family-Routines were dominant projects as they supported the demands of the family as an institution (Hagerstrand, 1982; Pred, 1981; Pred, 1981a; Spurling, 2009, 2010) but they also simultaneously met individual needs. Thus the Feeding-the-Meter Project ensured that there was enough electricity to cook dinner for the family but also deck the inside of the house out with lights at Christmas. This was an important family tradition for Zoe: "There were quite a few Christmas lights…So my 'leccy bill was working out more...We always do them every year. I wouldn't go without me lights!

Equally, the Maintaining-Family-Routines Project met the institutional family demands – ensuring children went to school in clean clothes – but also addressed individual concerns about being a good parent. In both projects what also emerged was the importance of past experiences in shaping future projects as Irene highlighted:

> What I have grown up with is the routine that I have kept for my own children. It's really weird but it works. It does work really well. They have set times for everything, dinner, and bed times are all set. So it does work. Everything that my mum did when I was a child, yeah, I do quite a lot.

Pred recognised the importance of early exposure to projects. He writes: "the motivations and intentions which lead an adult individual to choose among those projects, or roles and activity bundles, that are possible within the environment's constraints usually have deep roots in the history of his or her present or childhood family" (1981b, p. 6). Mallers and Strenger (2015) work on practice memories resonates with Pred's paper (1981b). They argue that such memories can enable practices to survive across decades through the embodiment of a practice captured in muscle memories. This was the case for a number of households with the Feeding-the-Meter Project. As Irene explained, a number of households mobilised elements from past performance as children:

> When we got home from school we could watch TV for an hour or so with the kids programmes but then the TV is turned off so no one could watch it because of the electricity. Mum was always worried about electricity and obviously being a 50p meter at the time as well. It was always having a 50p to put in the meter.

But another way a project can survive is through the circulation of elements across time and space. As Irene highlighted in the above passage her mother 'worried' about running out of 50 pence pieces to put into the meter. Over 20 years later the same meaning, is still in circulation as Irene highlighted:

> It's like when I see there's only £2 left on it, normally I'd be like panicking; 'Oh I've got to get to the shop, I've got to check, top the electricity up just in case it doesn't last a night.'

Yet despite worry being an element of the Feeding-the-Meter Project, almost all the interviewees had committed to the project as it gave them some control over how to manage their electricity demand and costs - important for both meeting the needs of the family as an institution and those of the individuals. The project-practitioners were generally successful in their endeavours to protect their most valued social practices and projects, through skilfully managing the Feeding-the-Meter Project. The families rarely found themselves without electricity and, if they did, it was only for a few hours. This reflects a Citizen's Advice Bureau study that highlighted that most disconnections were for short periods due to the logistics of having to go out to buy credit for the meter rather than not having money (Vyas, 2014). However, the latter was often down to being experts in managing their budget,

and **self-rationed extensively**" rather than having plenty of cash (Vyas, 2014, p. 18 emphasis added). Another study of prepayment households had a similar finding:

> An associated issue is self-rationing – when customers either limit energy use to save money, or restrict spend in other areas to ensure there is enough money to keep the meter topped up. (Purcell, 2014, p. 10)

My study too found that many of the households traded off one valued service against another, in order to have enough money to 'feed' the meter. They too were 'experts' in the Feeding-the-Meter Project but this did not mean they enjoyed their skilful project performances, as they did with Maintaining-Family-Routines Project. As Irene highlighted, when it is cold and she could not afford to put the central heating on, she had to tell her children to: "Cuddle up, put more clothes, bring a duvet down...we sit wrapped with blankets many times before rather than put the heating on." Val explained how she had to "go less with the energy, electric and gas, just so the children get the food they need."

4 CONCLUDING SUMMARY

This chapter has painted a picture of how deeply embedded energy is within a bundle of social practices with some seen as electricity 'hotspots'. In particular, what came across was the central role of laundering and how even with tight budgets, this social practice was often prioritised against other valued services including heating. But what this chapter also revealed was how little tension there was around energy in the home beyond the worry of feeding the meter. Parents generally accepted their children would leave lights on; be attached to screens; and make their clothes dirty.

This chapter was originally conceived to set the backdrop of the lived experiences of the households prior to solar PV installation. While it has offered rich insights into energy demand and social practices, it has also achieved more than this. It has highlighted the significant role that projects play within the family and also how individuals as project-practitioners not only mobilise elements and orchestrate practices, but also align institutional demands with individual concerns. The chapter also highlighted the potency of a project when it combines institutional demands with individual interests.

Two projects that stood out in terms of energy demand were Maintaining-Family-Routines Project and Feeding-the-Meter Family Project - both fulfilled institutional demands but also met personal priorities as well. Thus, many of the practitioners passionately performed the Maintaining-Family-Routines Project, not just because it helped resolve 'family peak' times but because they believed it was the right thing to do for their children. The Feeding-the-Meter Family Project was, however, not so straightforward. Practitioners prioritised the project because of the importance of maintaining a

constant supply of electricity for valued social practices. However, making a choice between heating or eating, or washing or cooking is unpleasant, what ever the skill of the practitioner.

CHAPTER 7

ADOPTING THE PROSUMING PROJECT

1 INTRODUCTION

The **last chapter** examined the period before the solar panels were installed and how energy demand was embedded in daily practices and projects. The research revealed two dominant projects: Feeding-the-Meter and Maintaining-Family-Routines. Both emerged due to the institutional influences, but also covered individual concerns.

This chapter will address the second subsidiary research question: "What are the key features of the adopting stage of a Prosuming Project for social housing tenants?" As well as contributing to the overarching research question: "Why and how does prosuming evolve for social housing tenants?" The chapter is guided by the first stage of the conceptual framework - adoption. Its focus is on how the Prosuming Project came to be adopted by the seven households and how individuals turned their first encounters into becoming practitioners by mobilising elements and orchestrating practices and projects.

In more detail:

Section 2 explores the households' first encounters with prosuming. Then it explores the processes - adding, transmuting and circulating - to mobilise a new set of elements within the context of an estate facing multiple deprivation indices. What also emerged was that in order for the Prosuming Project to find space within busy daily paths, it needed to start aligning itself with two dominant projects: Feeding-the-Meter and Maintaining-Family-Routines.

Section 3 examines two initial pathways open to the households - rejecting the Prosuming Project or adopting it. All seven households eventually adopted it and became tentative prosumers - experimenting with the project to varying degrees - before moving to the next establishing stage.

Section 4 concludes the chapter.

2 MOBILISATION & ORCHESTRATION

2.1 First encounters

Shove et al highlight how there are many ways that practitioners come to be recruited to a practice or 'adopted' using the project terminology of this thesis: "Accidents of birth, history and location are all important, as are social networks" (2012, p. 66). Prior to the installation of the solar panels, only two of the households had encountered the Prosuming Project through their social networks - and only one of these was situated in a social housing context. Thus for most of the practitioners, "first encounters" were primarily driven by the media (Shove et al., 2012, p. 66). This was similar to the early days of the evolution of Nordic Walking as a leisure practice, as most people had not experienced it first hand:

> Since any one practitioner has limited first-hand experience of how a practice is reproduced by others, it is nearly always the case that elements of meaning are quite literally mediated. In Finland, representations and pictures of Nordic Walking in the press and on TV proved crucial in making key associations, for example depicting Nordic Walkers in natural rather than urban settings... (Shove et al., 2012, p. 55).

Below, I describe the elements that the interviewees associated with their first encounters with the Prosuming Project and why they struggled to mobilise them within a disadvantaged community.

2.1.1 Materials

All the households in the study were aware that to generate solar power for a household, an array of photovoltaic roof panels was needed. Despite the price reduction of solar in recent years ("Energy Savings Trust," 2017b; Ingrams, 2017), they still cost thousands of pounds, making them beyond the reach of all of them. While most domestic solar panels belong to home owners, in recent years social housing landlords had started to use the Government's feed-in-tariff subsidy to purchase arrays for their tenants (Clark, 2014; Vaughan, 2016). However, most of the households in the study were not aware of this. They were also not initially aware that their own social landlord had decided to invest in solar panels in their community.

The landlord had originally hoped to install solar panels in over 1000 properties but progressive reductions in the feed-in-tariffs meant this was reduced to just over a quarter. In the first round, approximately 150 households were selected by the landlord on the grounds that they lived in an area with high multiple deprivation indices (DCLG, 2015), as well as having a suitable house in terms of sunlight exposure. The seven families in this study were all offered the option to have free solar PV

panels installed and this would appear to be the point at which they could mobilise the material element that only a few weeks before would have been completely out of their reach. But, as with social practices, all three elements needed to come together for a project performance. Without the meaning and competence elements, adoption remained out of reach of the households in the study.

2.1.2 Meanings

The households found out about the solar scheme, when they received a letter from their landlord and the solar installer. However, most of them did not believe it was genuine as Barbara explained:

> We got a letter through the door... I looked at it and obviously you just think, 'this is too good to be true...', put it in the drawer, didn't think any more of it...Didn't even reply back to the letter.

Irene summed up what many of the households felt about solar panels: "They are expensive and normally only rich people can have them." A number of them also talked about the influence of the media on their perception of prosuming. As Barbara said:

> When you watch programmes [they are] to do with posh [houses]. You just think about that sort of house, you don't think about it on a council estate to be honest, you don't do you? .... People that are building their own houses tend to put [solar panels]...on the roof to save energy.

Despite the fact that numerous social housing landlords were investing in solar PV technology, no one mentioned television programmes or magazine articles on tenants being prosumers. As Barbara said, "I wouldn't even dream of thinking I'm going to put solar panels on my house. It's a council house anyway, do you know what I mean, why am I going to do that?"

Out of the seven families, only one knew someone in social housing who had been given solar PV panels. Thus the prevailing meaning for most of the families was that prosuming was associated with affluence rather than social housing tenants with prepayment meters. The other association with the Prosuming Project was that it could save money on electricity costs, although a number of the interviewees were vague about this. As Irene said, "I knew they cut down their electricity bill but I didn't know how they would work to do such a thing." While Barbara said, "[solar panels] generate power and they're supposed to lower your energy bills. That's all I know." Although a number of the interviewees pointed out that those who own their solar panels could benefit from both the solar power and the Government's feed-in-tariff. As Val said: "If you are rich and you have your own solar panels, you get it reimbursed back into your pocket."

2.1.3 Competence

For many of the households it took a face-to-face visit from the solar installer to convince them to sign up to the solar PV scheme. The visits also doubled up as an opportunity to survey the house and convey basic information about how the household could use the solar power. However, despite this meeting, a number of the families were under the mistaken belief that their PV system had built in battery storage, allowing them to use the solar power at night as Val said:

> If you are using it, like your washing machine at night time, it will cost you nothing to use with the solar panels 'cos of what you've stored of the energy. You can run your washing machine with nothing, as same as your TV…If there is enough stored, you can actually not use anything on your electric meter.

Val went on to say that the installer had told her to use the solar panels in the evenings and at night because "it will cost you nothing". I was present at this and other first meetings, and never once heard the surveyor tell households that solar power was available at night or that there was a battery storage built into the system. However, this illustrates the potential pitfalls in conveying information, even when it is face to face.

The second opportunity for the households to learn more about their solar PV system, was during the installation of the panels. In most cases, the electrician gave them an information sheet and an explanation of how it worked. However, again, most of the interviewees did not find this as helpful as they would have liked and, in many cases, were still left confused. As Harry explained:

> When they first said they were going to do it, I had no understanding of the concept, I thought well we have a key meter, so is it going to credit the meter. But I thought it can't do that, the way they wired it up sort of bypasses the meter and goes into a little black box...He [the installer] did explain, but he was talking in all sorts of technical terms you know and expected me to understand.

While Zoe pointed out: "When we first got the solar panels put in and I mean I knew...roughly what they did, but I didn't really know anything else. I mean they just came in and stuck them in and off they went sort of thing." Maggie had a similar experience:

> Well...like I been asking questions and they said, 'Oh we will give you a [sheet].... at the end.' They give me a ...[sheet] that is a bit rubbish. It didn't explain how it works or anything... It wasn't like very useful.

For example, the information sheet included the following statement: "In the event that we spot a drop in performance or potential error we will call you first to check a few simple things (i.e. has the MCB tripped or is there a power cut)". And yet the letter does not explain what the 'MCB' is. In addition, it informed tenants that their system had a "generation meter that shows your total solar

electricity production", even though this had been installed in the loft making it impossible for most households to use it. As Harry highlighted, it was a "shame there isn't anything to see, physically, to see how much you've got."

Despite these issues, two of the households had very different experiences of interacting with the solar installers and the information sheet. As Frankie explained: "I mean they told me to use it when the sun was beaming so I just did, and it worked. And I'm happy!" Barbara also found the meetings helpful, as well as the accompanying written information. She said: "It's very beneficial.... But it's common sense to be honest isn't it? Basically when the sun's out stick everything on." For both women the explanations from the solar installers and accompanying information sheet made sense to them - sunshine equals solar power.

Yet for most of the households, the two meetings from the solar installer left them without a clear understanding of the knowledge needed to successful adopt prosuming as a project. As Val said, "It's not rocket science what it does... I don't see why they [the installers] couldn't just explain it". As I was not present at these second meetings, it was not clear why in some cases the households could mobilise the necessary competence elements, but not in others. It may well be different approaches to knowledge sharing taken by the installers, or that the individuals had different learning styles. What did seem consistent, however, is the more practical the knowledge (Royston, 2015) passed on by the solar installers, the more it appeared to resonate with individual households. For example, one phrase from a solar installer that was repeated by a householder was "use it or lose it!".

2.2 A new element set

The previous section highlights that even though the households were offered free solar panels they were not able to adopt the Prosuming Project until they could mobilise a new set of elements (Hui and Spurling, 2013). The process that enabled this was the addition, transmutation and circulation of elements. This empirical finding was guided by the work of Shove et al:

> Practices…can and do merge and evolve through multiple minor adjustments made in private but made possible by the circulation of new and different materials, meanings and forms of competence (Shove et al., 2012, p. 73).

2.2.1 Additions

Given the competing demands on their daily paths, the majority of the households in the study wanted to first be reassured that the Prosuming Project would deliver the promised cuts to their electricity bills before adopting it. As Barbara said:

> You're conscious of ...[the solar power] at the beginning, because I think you're a bit, kind of a bit skeptical, as you're thinking how is this working, and why is it working, and what's happening?

To answer these questions they needed to mobilise an additional **material element** and to do so they turned to a technology they knew well - the prepayment electricity meter. For example, Barbara used her prepayment meter, prior to and post solar PV installation; to work out how much money the laundering was costing. As she said:

> After a while you're thinking: 'Well it does work because I did my little test.' Then it just becomes the normal thing that's working in your house and it's saving you money.

Ed also used the prepayment meter to find out how well the solar panels were working for him. In the end, it turned out to be an early indicator that the Prosuming Project was not making the energy and financial saving he had hoped for. Many of the practitioners also used the prepayment meter as a casual, but ongoing monitoring tool to help them keep track of whether the Prosuming Project was continuing to deliver the anticipated financial savings. As Harry explained:

> I've got the TV on, I've got the Sky box on, and I have been using electric all day, so you just want to keep pushing [the prepayment meter]...One day we used 20, 30 pence...we had the washing machine on all day.

Val made the point that there was a risk that solar PV houses with no prepayment electricity meters may end up using more electricity. She said: "If you had...a quarterly bill and solar panel... you might even use more because you, because there is nothing physically in your house to remind you that, 'Oh, I've got to top that up.' "

2.2.2 Transmutation & circulation

The mobilisation of the prepayment meter as a material element was an important part of the adoption process for the Prosuming Project. But, again, on its own it was not enough to ensure all the necessary elements were mobilised; other processes needed to take place. The next process that took place was 'transmutation' that is defined by the Oxford Dictionary as the "action of changing or the state of being changed into another form"[8]. The term encompasses how elements can be "modified, reconfigured and adapted" during performances (Shove et al., 2012, p. 52).

[8] https://en.oxforddictionaries.com/definition/transmutation

The final process was the 'circulation' of elements as they "move from one situation or person to another and as they circulate between practices"[9] (Shove et al., 2012, p. 52.) This process of transmutation and circulation was in evidence during the adoption phase for all the households, to varying degrees. Thus the **meaning element** started to change from an association that solar panels were exclusively for the rich, in the words of Maggie "only posh people have them, because they're expensive", to also being connected with people on low incomes. This change to the meaning element happened in stages. Firstly, the solar installation company sent a surveyor to knock on doors and reassure the households that the offer was genuine. Secondly, word started to spread of the benefits of prosuming within the community. For example, Frankie urged as many people as possible to sign up for the scheme: "My best friend's mum got offered them and she said to me, 'You've got solar panels?', and I'm like, 'Get them, get them, get them, get them, get them!' " Finally, there was the visual impact of the solar panels starting to appear on the roofs of some of the houses on the estate, as Barbara highlighted:

> I'm just one of those that just thinks, 'Free? That's not going to happen to me...' I didn't really understand it to be honest, and then as you do walk around the estate...you can see one that has been done and as you come down the road and you can see [another] couple that have been done. So, as I'm thinking about it myself… 'Yeah, it's happening'.

Barbara also told a story of a women who initially refused the solar panels and then changed her mind as her neighbours started to have them installed: "[she]... turned round to my husband and said, 'Well, we may as well, other people are having them put up'." The Prosuming Project was no longer just associated with affluence; it also started to be coupled with households living on a social housing estate.

Finally, the **competence element** was also transmuted as the interviewees developed their own embodied knowledge as prosuming practitioners. For most of the households, the competence element from their first encounters of the Prosuming Project was not adequate to ensure a successful integration into a project-performance. Instead, the tenants started to fill in their knowledge gaps by developing 'know-how' or what has been termed "practical knowledge" by turning to their prepayment meters (Royston, 2015, p. 7). This was a key piece of the jigsaw needed for the households to have the capability to integrate the elements into a performance. For example, Barbara explained how initially after the solar panel installation she would keep checking the meter to see what difference it made, but after a while this knowledge became embodied:

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[9] I am indebted to Shove et al (2012) for the term 'circulation' as it has been instrumental in helping to explain the mobilisation of elements for a project. I have given the full citation so the reader can look up the reference if they wish. However, as the term is used so much throughout the thesis I have decided, on balance, that if I kept repeating the citation it risks disrupting the flow for the reader. However, in all cases the term builds on from the work of Shove et al (2012).

> It seemed a bit strange at first. Because you'd put things on and then you'd check the meter and you'd think, 'Oh I haven't used much'...But now I don't do that, I just don't think about it so much ... If you were on quarterly bills you can't really work out how it's working...until you get your bill.

It was not just Barbara that turned to her prepayment electricity meter to help develop know-how, all the households did this, to varying degrees. It was a critical material element in helping them develop embodied knowledge about prosuming and the newly transmuted competence element was the final piece in the jigsaw needed for the households to adopt the secondary project.

While the practitioners were instrumental in mobilising their own sets of elements, they did not have exclusive use of them. As panels appeared on roofs, and neighbours, family and friends shared solar stories, so the physical and social fabric of the estate began to change and with that the transmutation and circulation of elements. Solar panels were not hidden away in the private sphere of the home, but were on public display for anyone who cared to look up at a roof on the estate. This encourages the spread of the meaning and competence elements through "social contagion", in other words "between people who already knew each other as neighbours or as friends sharing other interests in common" (Shove et al., 2012, p. 68). A number of the practitioners shared solar stories at the school gates waiting to pick up their children. Irene said: "My friend said... she used a pound of electric in one week and she was over the moon!" Meanwhile Maggie urged a neighbour to clear her loft so she could have the panels installed:

> I said to her how much money I'm saving and she's like, 'Ah, that's really good, I should get mine done. Did I tell you why I didn't want them? Because my loft is full up with crap.' And I said 'It's worth cleaning it out, or just find out an area that they want to get to and just clear that area out you know? It is worth getting it done.'

In only a few weeks the Prosuming Project underwent a change as new materials, meanings and competence elements circulated through the shifting physical and social fabric on the estate. The project was no longer primarily associated with saving money for wealthy people, but also with social housing tenants, prepayment meters and the know-how developed from Feeding-the-Meter Project. In turn this new set of elements (Hui and Spurling, 2013) started to change a sense of 'solar entitlement' that had generally been missing at the start of the study. The Prosuming Project was no longer primarily associated with affluence, it could also be performed on a social housing estate.

2.3 Engaging with dominant projects

As we saw in the prologue, projects are often born from institutional demands but can also include individual concerns woven within them. From the outset, prosuming was a voluntary project. There was no obligation on the tenants to have the solar panels installed, nor any rules around the

consumption of the renewable electricity that was generated. Given this, the project had to work a lot harder to find space in the daily and life paths of individuals. As Shove et al write: "First encounters are surely critical, but where **participation is in any sense voluntary more is required** if practices are to retain faithful cohorts of suitably committed carriers" (2012, p. 69 emphasis added). The 'more' started to emerge as the households started to experiment with the Prosuming Project and found that they could find a space in their daily paths when it supported dominant projects such as Maintaining-Family-Routines and Feeding-the-Meter. In particular, washing was seen as an adaptable social practice that could fit with the Prosuming Project, as Barbara highlighted:

> I now do more things during the day I suppose. More in the mornings, put the washing on. Or when I come home from work at lunchtime puts a wash on. You're more conscious of the fact that its daylight and its sunny or its bright and you do it because you know you're running it and it's not going to cost you anything.

For Barbara, not only did the Prosuming Project work with her existing routines, but it also started to play an important role in the Feeding-the-Meter Project because it was saving electricity costs and contributing to her "energy frugality"(Jenkins et al., 2011, p. 21). This was also the case for Val although initially she had been unsure whether Prosuming Project would even work with her prepayment meter:

> He just said ...some weeks you might not have to put £5 on the electric meter. 'Cos that was what I was worried about...It's a council property so we are all key meters. Like well can you actually do it on a key meter, cos I would have thought we would have to change it all over? They're like, 'Oh no...You can use key meters doing it.' I was like, okay!

As we saw above, this knowledge was reinforced by households experimenting with the Prosuming Project and discovering that although a secondary project it could potentially support the Feeding-the-Meter Project and with that "valued social practices" such as cooking or washing (Shove et al., 2012, p. 135). Yet even in this early stage of adoption, there was an indication that as a voluntary project, prosuming would still need to take second place to dominant, institutional projects. This was most evident for Ed, who had originally been excited at the prospect of how the solar panels could reduce his energy costs, but quickly became disillusioned when this did not transpire in the weeks following installation.

> We are very suspicious and up and until someone explains to me what is happening and in what way am I gaining, and they really show me some evidence and say 'Look, it's a sunny day, this is what is happening'…Then that way, yes I would become convinced. Without that, there is no way to tell…

It took an additional meeting with the solar company's electrician to convince Ed that he was generating solar power by showing him the evidence on a solar energy monitor. In addition, he realised that even when he was at home during the week, his work shifts, emanating from another

dominant institutional project, took precedence. Given his shift patterns, Ed's daily path was often taken up with sleeping, rather than domestic chores. The additional meeting was critical as it gave the solar installer the opportunity to tailor the know-what of prosuming to the family's circumstances:

> After the explanation...he gave me that day...and reassured me that there was certainly energy being produced by the solar, that's when I had to go back to the family and discuss ...it. And everybody seemed to agree...If we are fortunate that day to have a very good sunny day, if there is any washing to be done and things like that, that's the best time to do it. And everybody's aware of that now; to take advantage of a very sunny day. But it's going to take a bit of time for me to get the proper results now because we find there isn't much happening ...during the day in the house because we are all at work most of the time, and, most of our cooking only happens in the evening.

Ed was the closest of all the seven households to rejecting the Prosuming Project - in other words not actively and simultaneously producing and consuming solar power. This was because his daily work rhythms prevented the synchronicity between solar generation and social practices such as cooking or laundering. Although in the end Ed joined all the other households in adopting the Prosuming Project, a number of them spoke about friends and neighbours who had not become prosumers because of work. As Tony said "There's neighbours that have got the solar panels but they're out, all day, every day...Come the evening they're not benefitting still …when they have to do the washing."

3 PRACTITONERS & PATHWAYS

3.1 Tentative Prosumers

What emerged during the adoption phase was the development of 'tentative' prosumers. The dictionary definition has two distinct meanings: the first as **'experimental'** and the second as **'cautious'**[10].

In terms of this first meaning, all seven households carried out experiments, to varying degrees, to see whether the Prosuming Project was worth investing time in. This was partly because of the demands made by institutional projects on their daily paths, but also wanting to keep space for other voluntary projects if prosuming did not meet their expectations. The Prosuming Project had to earn its place in a busy daily pathway. However, this experimental approach helped the households to mobilise the know-how needed for the Prosuming Project, as well as offering some support to the Feeding-the-Meter Project.

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[10] http://www.dictionary.com/browse/tentative and https://www.collinsdictionary.com/dictionary/english/tentative

The second meaning of being cautious applied to all but one of the households. The majority of them wanted to see if it was worth investing time in before they committed to the project. This was not, however, just about the logistics of fitting another project into an already packed daily path - as important as this was - it was also about whether to emotionally invest in prosuming. All the households were aware that it could make a significant difference to their finances so wanted to be sure that this would be the case before adopting the secondary project.

So before adopting the Prosuming Project the practitioners drew on elements from the Feeding-the-Meter Project to test it out, as well as monitoring whether the benefits continued. As the householders began to develop confidence in the Prosuming Project, they started to perform it more regularly, building up their experience. This was both by using the prepayment meter but also by increasingly relying on the know-how they were developing as prosuming practitioners enabling them to segue from the adopting to the establishing phase. The one householder that did not take a cautious approach already knew that prosuming could make a difference as she had a friend who lived in social housing with solar panels. She swiftly moved from adopting to establishing in just a matter of days, while Ed took around two months to mobilise the competence elements and complete this transition.

3.2 Adopting & Rejecting

To adopt implies choosing to take up "an idea, method, or course of action"[11], but as we have seen with the Prosuming Project, adoption was a process. For some, like Frankie, it was relatively brief. Even before the solar programme had been implemented, she knew someone who had solar panels and as soon as they started to appear on her estate she thought: "Why have they got them and I haven't?" Shortly after this the letter from the solar installer came through. With the meaning and material elements in place, all she needed was the competence element in order to integrate the project into a performance. While she used the prepayment meter to ensure she was saving money through her performance, she quickly passed from adopting to establishing the Prosuming Project.

But for other households, adoption was more fluid as they needed time to mobilise a set of elements by which to become practitioners - particularly around meaning and competences. It involved testing out the project by adapting social practices to it, and then monitoring the difference it made to their Feeding-the-Meter Project. As Irene explained: "I mean I was keeping a check on my electric meter and... keeping a diary basically of what I was putting on and how much was being used." Once she

[11] https://en.oxforddictionaries.com/definition/adopt

and most of the other households had tested the project, they began to build it into their daily paths and move to the establishing phase of the project.

As highlighted in Chapter 3, there is a tension between adoption and rejection. As Hards writes, "relatively little attention has so far been paid to the process by which people withdraw from practices" (2011, p. 104). In particular, as Walker (2012) points out, such tensions during the initial recruitment stage are rarely discussed in social practice studies. This study has highlighted just how precarious adoption of the Prosuming Project was for the seven households living in social housing. It has revealed that many of them were ready to reject the Prosuming Project even before they had the solar panels installed, as they could not mobilise the necessary elements to perform it within a disadvantaged community.

So while the provision of solar panels by the social landlord was a critical material element, it was not enough for practitioners to adopt the Prosuming Project. In order to become prosuming practitioners, the households not only needed the elements of materials, competence and meaning - but in a form that was accessible and relevant to them. So the meaning of prosuming was not just about "posh" people but also could be, in the words of Tony, about "the poor that have got the key meters". The households also needed a competence element that could work closely with the Feeding-the-Meter Project. However, in the end, however, all seven households adopted the Prosuming Project and now one rejected it.

3.3 A summary of individual pathways

Table 6 below summarises the pathways for each household during this initial adoption stage:

Table 6 Adopting: Tentative Prosumers - a summary of individual pathways

Irene	Irene did not initially believe the offer of free solar panels. However, once convinced by the solar installers it was a genuine offer, she deferred to her husband Tony as the expert on this issue. However, quite quickly, Irene not Tony emerged as the primary prosuming practitioner. It was she who mobilised the elements for adoption, including turning to the prepayment electricity meter to test out the Prosuming Project.
Frankie	Frankie had a friend who had solar panels so from the outset the meaning element for her was that social housing tenants have a solar entitlement. Frankie also found it easy to access the competence element as for her the solar installer's advice was straightforward - a sunny day equals power so use your appliances. However, like the other householders she too used the prepayment meter as an additional material element to help her check she was supporting her Feeding-the-Meter Project. For Frankie the adoption period was swift and she quickly moved to being a periodic prosumer and crossing from adoption to the establishing stage.
Val	Val, like many of the other households, did not believe the solar PV offer, and it took the solar company knocking on her door for her to be convinced. She also struggled with the competence element and even following a discussion with the solar surveyor, was left believing that it is best to use appliances at night to utilise the solar power. However, by drawing on her skills and knowledge from the Feeding-the-Meter Project, she quickly worked out how to use the solar power and adopted the Prosuming Project.
Barbara	Barbara also did not believe the original letter offering the solar panels and ignored it. And again it took the solar installation company knocking on her door to convince her that it was a genuine offer. Again the meaning of prosuming was associated with 'poshness' and eco-homes, not social housing. However, like Frankie, Barbara appreciated the simple 'know-how' type explanation from her installer - sun equals power. But she was more cautious and carried out a test before adopting the Prosuming Project, as well as continuing to monitor it, from time to time, using the prepayment meter.
Maggie	Maggie was initially excited by the prospect of adopting the Prosuming Project and persuaded her partner Harry to have the solar panels fitted, as well as encouraging friends and neighbours to sign up to the scheme. However, she and Harry found the explanation from the solar installer and, their accompanying letter, unclear. Instead, Harry used the prepayment meter to work out how best to use the system in order to adopt the project.
Zoe	Zoe was initially concerned that the Prosuming Project would be yet another domestic task she would have to undertake, and be difficult to fit into her busy day, which included shift work. However, although Zoe was the main project-practitioner, she often shared the performances with her 19 year old daughter, Tracey. Zoe felt she initially did not have the information needed to be a prosumer. However, as the weeks went back she gained in confidence in using the prepayment meter, and working out with Tracey, how best to access the power.
Ed	Ed was keen to have the solar panels installed, and also used his prepayment meter to carry out a series of tests on how best to use the power. But unlike the other six households, in his case the tests pointed to a problem with the Prosuming Project as it was not supporting his Feeding-the-Meter Project. Ed increasingly became disappointed and disillusioned with the scheme and started to question who was benefiting from it. It took an extra visit from the solar installer to convince Ed the system was working and be given the tailored advice to enable him to adopt the project. He discovered that his, and his wife's shift work was limiting their ability to orchestrate practices to the Prosuming Project. However, following the visit, Ed had the knowledge he needed to adopt the Prosuming Project but also lowered his expectations of it.

4 CONCLUDING SUMMARY

This chapter reinforced the findings from the prologue that institutions are woven into the daily lives of practitioners in their performance of projects. It highlights the importance of individuals mobilising a set of elements through the process of adding, transmuting and circulating as well as orchestrating social practices to the performance of the Prosuming Project. Importantly, it showed that solar panels were not enough on their own to turn a household into a prosumer. Not only did all the households need to draw on new elements for meanings and competence, but also to add the prepayment electricity meter as an additional material element.

What this chapter highlighted was the importance of practitioners being able to mobilise a set of elements from within their own community. Undoubtedly this set would look different if the practitioners were home owners. For example, if they had enough money to purchase solar panels it is unlikely they would be using a prepayment meter to pay for their electricity cost. They may even have purchased their own solar energy monitors, which are designed to give real time information on energy generation and consumption.

The chapter also highlighted the tensions between adoption and rejection and the highly fragile nature of the Prosuming Project. There were insights into how dominant, institutional projects emanating from work could undermine the Prosuming Project, but also how aligning it with the dominant projects of Feeding-the-Meter and the Maintaining-Family-Routines Project made it easier to adopt. Yet what this chapter has also shown, is how rapidly elements can change. Once the solar panels were installed, individuals experimented and developed new competences, as well as drawing on elements from Feeding-the-Meter Family Project and Maintaining-Family-Routines Project. In particular, practitioners built on the limited amount of technical information - 'know-what' - given to them from the solar installers, and started to turn it into embodied, practical knowledge - 'know-how' (Royston, 2014). We also saw how prosuming practitioners had to navigate their way around dominant, institutional projects and orchestrate these alongside practices for a project performance. The closer the Prosuming Project came to aligning itself with the dominant institutional projects of Feeding-the-Meter and Maintaining-Family-Routines, the more likely it was that individuals would adopt the project and carve out time for it in busy daily paths.

This chapter has thus offered some useful insights to the next chapter. In particular, it has highlighted the importance of mobilising a set of elements for prosuming and the role of dominant, institutional projects in establishing a secondary project such as prosuming. It has also

shown the tensions between adoption and rejection that is replaced by establishing and defecting in the next stage. Finally, it has shown that there is a continuum between adopting and establishing. For each practitioner the timescale was slightly different, but all ended up moving to the second stage of the Prosuming Project.

CHAPTER 8

ESTABLISHING THE PROSUMING PROJECT

1 INTRODUCTION

The **last chapter** gave an insight into how the Prosuming Project came to be adopted by all seven households. It highlighted how practitioners needed to mobilise their own set of elements from within their community to be able to perform the project, as well as revealing the importance of the relationship between dominant and secondary projects such as prosuming. In the end, all seven practitioners ended up as tentative prosumers before moving to the second phase of establishing a project.

This chapter will address the third subsidiary research question: "**What are the key features of the establishing stage of a Prosuming Project for social housing tenants**?" as well as contributing to the overarching research question "How and why does a 'Prosuming Project' evolve for social housing tenants?" The chapter is guided by the second stage of the conceptual framework – establishing. Its focus is on how the Prosuming Project manifested itself in the daily paths of practitioners. It highlights that while the elements were fairly stable, they still underwent some changes during this period. Additionally, this period was marked by a complex relationship between prosuming as a secondary project, and dominant, institutional projects. This was further complicated by the role of synchronicity, finances and the changing seasons.

In more detail:

Section 2 shows how, despite a set of elements being mobilised during the adopting stage, there still continued to be a degree of flux as practitioners established the Prosuming Project into their daily paths. However, what was most in evidence was the shifting alignment between prosuming and the Maintaining-Family Routines Projects and the Feeding-the-Meter Project - both strengthening and undermining the secondary, voluntary project. This relationship was also affected by the process of social-solar synchronisation and the benefits that accrued from this. However, as synchronisation started to reduce as the seasons changed, there was an increasing misalignment between the Prosuming Project and the dominant projects.

Section 3 examines how householders became 'periodic' prosumers during this committing phase. They started to embed the project into their daily lives but could easily find themselves distracted from performing it due to busy daily paths or changing weather. During this period the households loosely divided into two groups. There were those who took an extended break over the winter - in effect becoming seasonal periodic prosumers - and the others who segued from periodic to transformative prosumers and from establishing to committing to the Prosuming Project. Additionally, one practitioner defected from prosuming.

Section 4 concludes the chapter.

2 MOBILISATION & ORCHESTRATION

2.1 Embedding & evolving of elements

The last chapter highlighted how the seven households in the study mobilised elements and started to align the Prosuming Project with dominant, institutional projects. This enabled them to configure a new set of elements in order to adopt the Prosuming Project and move on to the establishing phase. Given this, the establishing phase, at least on the surface, appeared to be largely marked by the bedding in of the elements into performances by the prosuming practitioners. However, under the surface there was still some degree of flux as practitioners continued to mobilise new elements as their performances evolved, although the changes were not as marked as during the adopting phase.

Thus, as practitioners became more experienced with the Prosuming Project, they relied less on the prepayment meter as a **material element** to test out the solar system. Instead, they increasingly drew on time management skills from the Maintaining-Family-Routines Project, as well as the know-how gained from the Feeding-the-Meter Project to improve their performances. In addition to drawing on the **competent element**s from these dominant, institutional projects, they were also building up their own embodied know-how from their performances. Finally, the solar panels as a material element increasingly took on a dual role during this period. The panels not only produced the solar power needed to be a prosumer, but their public presence on the roofs of the estate served as a constant reminder for the **meaning element**. In essence, the Prosuming Project was not just associated with affluent areas of the country, it also could be undertaken by social housing tenants in a low-income area. This process reflects Hui and Spurling's (2013) assertion that elements are never static and, like practitioners, evolve over time.

This period also marks a change in the relationship between the Prosuming Project and Feeding-the-Meter and Maintaining-Family-Routines projects as it became more complex. Mobilisation of elements and orchestration of practices became more closely interwoven between all three projects. This was further complicated by two other influences at work, synchronicity and finances, resulting in both the strengthening as well as the undermining of the Prosuming Project as it sought to establish itself in the daily paths of practitioners.

2.2 Strengthening the Prosuming Project

2.2.1 Synchronicity

Flexibility

As we saw in the prologue, routines are driven by a range of domestic practices. Walker argues that what "we classify as rhythms are essentially patterns in the routinised or habituated doing of practices in similar ways at similar times (eating, sleeping, washing, for example)" (2014, p. 51). The social practices that had the most flexibility in terms of the timing of routines were generally those undertaken by a single person at any one time. Clothes washing was one of the most flexible of all the domestic social practices as the performance was usually undertaken by one individual. In addition, the practice could often be fitted round family and work demands and rarely required complex coordination or negotiation with other household members as Frankie highlights:

> Well I'd, finish work and if the sun was beaming, and I'd come home then the first thing I'd do is put a load of washing on. Or I'd put a load on before I went to work, come home and it would be done, you know, put another one on, use the tumble drier. Pick the kids up from school, you know, I'd do all my washing.

This finding reflects the Durham study (Bulkeley et al., 2014) that examined the flexibility of different domestic routines in terms of their potential for moving from early evening peak electricity periods. It found that social practices such as washing clothes, could respond more flexibly to the introduction of peak tariffs as they "were often found to be solitary tasks, indeed in most cases a practice performed by a woman…[it] does not require a complex and social re-calibration of rhythms (Powells et al., 2014, p. 9).

Triggers

The Durham study also highlighted how energy related practices "...can have starting points, triggers, which lead to certain practices, such as a TV show finishing and a kettle being

boiled"(Bulkeley et al., 2014, p. 55) For a number of the households in my study, the trigger was simply daylight as Barbara highlighted:

> I'm now...doing more things during the day I suppose...You're more conscious of the fact that it's daylight and it's sunny or it's bright and you do it because you know ... it's not going to cost you anything.

The sun in particular was a powerful cue to remind the households to continue to adapt their domestic routines to fit in with the production of solar energy. The knowledge came from a mix of sources. In some cases households picked up from the installer that a sunny day equals solar power. In others they experimented and could see that sunny days made a difference and this became embodied as part of their prosuming performances. As Harry said: "I try to make the most of it. I put the washing machine on just because it was sunny, otherwise I probably wouldn't be bothered. But I didn't want to waste it."

Walker uses the term "natural-social synchronisation" to describe the ability of a social practice to adapt to the rhythms of everyday life and the natural world (2014, p. 53). He asserts that the "sun does generate an important sense of rhythmic patterning to light-demanding social practices" (Ibid). This process is intensified for prosumers as they are not, for example, just coordinating lighting practices with daylight hours, but a range of domestic routines to capture the solar power. Given this, I have adapted Walker's (2014) concept and instead named it 'social-solar synchronisation'. The term social comes first, because it was critical for the practitioners that the timing of prosuming fitted round their family and work commitments - not the other way round. This included some practitioners 'reading' the weather, such as looking up at the sky or listening to weather forecasts to shoehorn prosuming within busy daily paths. For example, Frankie explains how she now planned her prosuming activities by watching the forecast on television when she gets up. If she was at work when it was sunny, she would use the washing machine timer:

> You just put the washing machine on as a delayed start, because obviously I leave at half past eight. So, if you put it on a two hour delay...[and] the sun's shining then you're benefitting from the solar panels, while you're not actually here.

Drying practices - using a tumble dryer as a material element - were also orchestrated to the Prosuming Project. Again, in most cases it was undertaken by one person and, like washing, it also offered a flexibility to fit within busy daily pathways (Powells et al., 2014). However, for Tracey the trigger to orchestrate practices to the Prosuming Project was a combination of daylight hours and her mother going to work in the morning. Before Zoe left for work she would put on the washing machine, and Tracey would follow this up by putting the load into the tumble dryer to

make use of any solar power generated. Tracey explained how this routine had changed significantly compared with pre-solar PV days:

> I wouldn't sort of think about doing it during the day, I'd put it on when [my mum] got back from work or I'd do it in the evening... But now I do make more of a conscious effort to put it on during the day and stuff so it's using the solar panel energy.

But for most of the households the trigger to undertake the Prosuming Project was, more often than not, sunlight. Additionally, what emerged was that sunlight was not only the trigger for one practice, but could also trigger a set sequence of domestic activities (Bulkeley et al., 2016) as Frankie explained:

> So I'll come in, I'll do the hoovering and I'll have the telly on, or the music on...I'll go upstairs, I'll hoover and I'll make sure that I go round all the rooms you know when the sun's out...I'll take the curtains down, and strip their beds like when it's sunny....If I know it's going be hot through the week I'll just do it on the Monday or the Tuesday when I finish work and there's no kids here and I can get it done.

Lifecycle

Cooking, however, was generally not seen as a flexible practice and this again reflects findings from the Durham study (Powells et al., 2014). Even when it was just one person cooking, as was the case in many of the households in the study, the issue was that it was closely tied into eating practices, which invariably involved different family members. For most of the families, regular meal times were closely aligned to the dominant Maintaining Family Routines Project, which met not only institutional demands for meals to fit round school and work hours, but also a commitment to being a good parent. Irene explained how problematic it would be to change her family's meal times:

> I have always done their dinner at a set time. It has been like this since my children were little, so, it's my routine. It would throw us all out big time [to change]. Yeah, it would be very difficult.

However, there is a suggestion from this study that cooking flexibility may change as the lifecycle of the family unit matures. Zoe, a single parent with three teenage children ranging from 15 to 19 years, saw cooking as a flexible practice offering 'social-solar synchronisation' for the Prosuming Project. Although her shifts changed regularly, she tried to set aside time on a weekly basis to buy in bulk from a market and then batch cook a large number of meals during the day. Zoe would then freeze them for her family to heat up as and when they need them:

> It depends, as I say, if I've been working or whatever...I'll try and cook sort of bulk, so like meat puddings or whatever, I'll make a load up. I've got three rings going, just do the whole lot on one fowl swoop sort of thing...I mean I did used to do a bit of bulk cooking but not very often. So I probably done more since we've have the solar panels.

One reason why it was possible for Zoe to adapt her cooking practices to the day time, is that the family rarely ate together as her older teenagers were often out in the evening . She said:

> Yeah, I mean there used to be a sit down meal at six that was it, everyone would get up, clean up, sort out. But now my oldest son is out a lot of the time till about 9 o'clock. He's gone off to do homework or he's off at a mate's. My daughter has got college sometimes she doesn't finish till late. It's a case of they'll have to eat when they get in.

It is quite possible, in the future, that the other households in the study will also include cooking as part of their Prosuming Project as their children get older and the lifecycle of the family evolves. However, as Frankie with three children pointed out, at the moment there was no chance she was going to find time in her busy daily path for such activity. "No, I not gonna batch cook in the afternoon or anything like that because I'm too busy."

Similar to cooking, the ICT based 'education, socialising and entertainment' practice (Nicholls and Strengers, 2015) involved different family members and again were less flexible as a result. Even with the trend for young people to turn to internet based activities that are on offer 24/7(Coughlan, 2016), this was not seen by the families as an opportunity to shift demand to coincide with solar production. While these practices could potentially coincide with solar power generation, they were not actively orchestrated by practitioners because of the involvement of different family members as well as institutional demands of work and school.

2.2.2 Valuing the benefits

As the prosumers moved from adopting through to establishing, all were reporting some financial savings of between £20 and £50 a month over the summer. In some cases, this reflected well over a 50 percent drop on their prepayment electricity costs. The reductions in electricity costs had two main influences on the households. Firstly, it generally meant they had more money in their pockets to spend on valued practices, thus decreasing the difficult 'heat or eat' type decisions as Val explained:

> Well the money I save will help me top up my gas. So I won't have to eat into my food budget. So the saving on my electric will go extra onto my gas so then I won't be running out and I can afford to heat my home then.

Secondly, the Prosuming Project also gave households the potential to perform certain social practices without even drawing on the prepayment meter credit, if the timing of the performance coincided with solar generation. This again offered the practitioners more flexibility in prioritising valued social practices. For example, Val found that she not only saved on the cost of her electricity but also had the additional benefit of being able to cook and wash clothes on a Sunday as she explained:

> So ...it would be one or the other basically, I couldn't do both. Whereas now I can do both and ...it's going back to how it was when I was with their dad that I can afford to do that...it's great...if the kids wanted their iPads all charged up and my phone was charging, it can all go, it can all be charged at once, it didn't bother me. If they want their X-Boxes and the TVs were upstairs, it didn't bother me because I thought, that's alright, if it's a nice sunny day, they can do what they like.

As practitioners, they were also discovering that the Prosuming Project could be a significant support to their dominant, institution projects. For example, during the initial establishing phase that coincided with the summer, practitioners found it easier to perform the Feeding-the-Meter Project as demonstrated by Frankie:

> I went down from £30, I was still putting it on because it was habit, and then I realised I don't need that. Now I'm putting £20 on and I didn't even need that, and I was using, some weeks I was only using £10 worth of electricity.

The findings reflect the Durham study of solar PV and domestic practices that saw households looking to "re-align practices around new incentive structures" and that "financial calculation are a critical part of everyday life" (Bulkeley et al., 2014, p. 56). Such calculations were one of the ways that the Prosuming Project became more closely aligned with the Feeding the Meter Project. But in addition there was the potential to improve the performance of the Maintaining-Family-Routines Project. For example, Val started to use her washing machine a little more often as she was not so worried about the cost over the summer. It also meant she could improve her laundering performances by being able to segregate her washes into coloureds and whites rather than all being mixed together.

Additionally, a few households also looked to adapting social practices as a result of the free solar power. For example, Barbara and Maggie considered using the tumble dryer more often rather than the washing line as it made their lives easier and could be run on the solar power. But even though they raised this as a possibility, there was not much evidence of it happening compared with other studies who have identified solar PV users going out of their way to take advantage of the free solar power (Abi-Ghanem and Haggett, 2011; Baborska-Narozny et al., 2016; Ellsworth-Krebs and Reid, 2016; Strengers, 2013). The difference with the seven families in this study is that for most, frugality underpinned their domestic routines to varying degrees. This meant that generally they hated the idea of being wasteful, even with solar power that was not costing them anything. There was not much evidence of Abi-Ghanem and Hagget's "opportunistic users" (2011, p. 156).

2.3 Undermining the Prosuming Project

2.3.1 Losing synchronicity

School holidays

Through social-solar synchronisation, prosuming practitioners learnt from, and supported, the dominant projects of Maintaining-Family Routines and Feeding-the-Meter. Yet as prosuming practitioners began to embed the project into their daily paths, they also inevitably experienced changes to their routines, particularly around school holidays. During the school holidays, the family peaks (Nicholls and Strengers, 2015) were not so intensive; children could go to bed, get up, and eat later, developing their own rhythms rather than those imposed by educational institutions. Zoe noticed this in her own family when the rhythms' of the household became more irregular over Christmas:

> Yeah, it's just, there's been a lot of sort of like evening meals going on because the kids have been coming in different times as well so they've been cooking a pizza when they get in sort of thing. So the oven's been probably on three times just to do three pizzas, you know...Yeah, I mean we haven't lately, haven't done much bulk cooking.

Yet for Zoe, as a single parent, there were still a lot of institutional work and family demands being made on her time over the Christmas period. This included having to continue to work shifts, cook more meals, and keep on top of a range of domestic chores with more people coming and going. As highlighted in the quote, one of the first projects to be squeezed out, albeit temporarily, was prosuming. Zoe simply did not have the time to devote to it - batch cooking was out of the question over this busy period - there were many other requests being made on her as a parent and practitioner of many different projects.

What seemed to happen to Zoe, and some of the other households, was that once the backbone of family routines and rhythms had been disrupted, the social-solar synchronisation was also undermined. Musicians often use rhythm tracks to keep the beat consistent throughout a song, and the dominant Maintaining-Family-Routines Project had a similar role in the family. As this project relaxed over the holidays - the Prosuming Project lost its underlying pulsating beat. Washing was a good example of this. For example, Zoe found that her washing practices went awry over the Christmas break and she was left trying to pick up the pieces in the New Year.

> I'm on about the eighth load of washing. After sorting the kid's room out as it was all over their floor.... I mean their bedroom's been a mess for a while, I keep moaning at them to do it. But with the toxic gloves you know, I finally did it out! But I've had the washing machine going all day yesterday and probably all day today.

However, by the end of the school holidays Zoe was looking forward to order being restored. She wanted to return to matching the Prosuming Project to the daily institutional rhythms imposed on her teenagers:

> I've been working every day... it's been a bit manic....So hopefully now they're all back to school and college things will settle down. Yeah, I think I just need to get the routine back, I think once I get back into the routine then ...everything else will come back into place. But it's just all been out at the moment.

Changing seasons

While the school holidays were a temporary state, changes to social-solar synchronisation brought much longer disruptions to the Prosuming Project. This largely came about because of the changing season that occurred during this establishing phase. For a number of the families their prosuming cue - a sunny day - was compromised by changing weather and reducing daylight hours. The knowledge they had built up around social-solar synchronisation was not tailored to a change in the natural seasonal rhythms. Initially, the change from summer to autumn was accommodated by all the practitioners - they continued their prosuming performances and were still able to save some money, albeit on a reduced scale compared with the summer. As Tony said:

> They were installed in the summer, it's now coming into the winter period. And...we're using more from the grid, so the cost is going up again. But... there is still a fraction saving even in this weather. So a saving's a saving. No matter how much.

But the real change happened when British Summer Time ended in the middle of October and with it the opportunity for "better synchronising daily patterns of practice with the availability of natural light" (Walker, 2014, p. 53). A number of the families struggled to adjust to the decreasing daylight hours, as well as the reduction in sunlight. Frankie explained how this seasonal change impacted on the Prosuming Project:

> It started changing, once ... the weather got a lot colder, and the nights are getting earlier as well, so we're not getting as much sunlight as what we'd normally get...I'd say once the clocks went back...you feel it more then.

Out of all the families, Frankie had enthusiastically embraced the solar panels from the start. She was happy with the knowledge given to her by the installers and saw the whole issue of using solar power as straightforward. As we saw in the last chapter, Frankie swiftly moved from being a tentative to a periodic prosumer; reinforced by the positive experience of the project and keeping a close eye on her prepayment meter:

> I remember doing six loads of washing and drying it, obviously I used the line as well, not just the tumble drier, and it wasn't even £2 on my electric for six loads of washing. So of

> course I brought everything, the curtains, the nets, the lot from upstairs and washed it all because it was free apart from the water, washing powder and the fabric conditioner.

This positive experience carried out through to the autumn, albeit with reduced financial savings, as sunlight hours reduced. However, after the clocks turned, the social-solar synchronisation made no sense any more and Frankie stopped prioritising the project. Once she had lost her sunlight cues, she reverted back to her pre-solar domestic routines:

> In the past...I was doing more of (the washing) at night, but obviously through the summer, I made sure I did it through the day. And now ...it doesn't really matter to me when I do it, because I'm not really benefitting from anything.

2.3.2 Questioning the benefits

British Summer Time and the onset of winter left a number of the practitioners disappointed with the Prosuming Project, not least of all Frankie: "Once it got to winter I was like heartbroken. I said, 'Look how much money I'm putting on now compared to what it was in the summer.' " Once again she found herself relying on the 'emergency' - a small amount of credit on the prepayment meter that acts as buffer before the electricity is cut off:

> I mean I always check the meter. I'm down into the emergency as well, it went the other night, it just all went black, and I was like, 'What the hell?' I put £35 on that! and, it had run out... But in the summer, I never use the emergency for anything.

Val too had to adjust from the summer where she and her children had relaxed over the use of electricity in the home. Instead she was confronted by the costs of her electricity rising again with the short days and bad weather. As she said: "rain, dark... shorter days…less daylight hours. Nothing. I was going back to putting a tenner to fifteen quid a week on it...just, because they weren't working." With the reduction in economic benefits for some of the households, the links between the Prosuming Project and the Feeding-the-Meter Family Project lessened. There was no longer the same virtuous circle helping to create justification of the Prosuming Project within the busy daily paths of some of the practitioners.

Additionally, as the families started to establish prosuming into their daily paths, some started to question the project. For example, both Harry and Maggie were disappointed to learn that the solar power was not in effect 'off grid' and instead was connected to their prepayment meter. No credit on the meter meant no solar power. Maggie had hoped that there would be two electrical systems - one through the prepayment meter and the other run by solar. As she said, this would: "just make me feel like I'm more in control of what I'm using, like you know, having to switch one off and switch the other one on...that [way] I know... everything I use is free."

They were not alone in feeling disappointed in this. Tony, too, had hoped that the system would work independently of the prepayment meter and he would be able to "just use the power as it comes in, but no, it still runs through the key meter". In some of the households, this was also linked to a wider disappointment about how the Government's microgeneration policy had been set up. For example, Val felt the energy companies were benefiting more than the social housing tenants as she explained:

> I'm only getting a slight portion out of it - really what [the energy companies] get out of is an awful lot more than what I'm taking. But it's going back to them free and I'm still paying for my usage... they're getting an awful lot back from having them on my roof... they're not buying energy from overseas, they're not buying it anywhere else, they generate off my roof.

Tony also questioned the focus on feed-in-tariffs, which benefited owner-occupiers rather than social housing tenants:

> "If you own the solar panels, you wouldn't need...[a] bank of batteries because the pay in tariff would still reflect back to you. Because at the end of the year the grid said you have supplied us with [this], you will get a cheque back... Whereas... we're not getting the savings, the councils or the landlords that own the properties…they are the ones that will benefit ..."

It is not surprising that the households raised these issues, as the information they had received about the solar panels had not explained that the capital costs of the solar panels had been covered from the Feed-in-Tariffs. Nor that the Local Authority would plough any excess income back into energy efficiency schemes for local people. The council was not making a 'profit' from their tenants.[12]

3 PRACTITIONERS & PATHWAYS

3.1 Periodic Prosumers

What emerged during the adoption phase was the development of tentative prosumers across all seven households. However, by the establishing phase, practitioners had developed confidence in the Prosuming Project as they started to see how it was supporting dominant projects and could be fitted into their daily pathways. Thus the tentative prosumer segued into the periodic prosumer. Like tentative, the definition of periodic also has a number of nuances. Two definitions in particular reflected this period: an event that occurs at regular intervals, and one that occurs intermittently.[13]

[12] Information about how the feed-in-tariffs were being used by the Local Authority to pay for the solar panels was included in the booklet I produced in collaboration with the households in the study, and their social housing landlord. It also explained how any financial surplus would be used for energy efficiency work for social housing.
[13] www.collinsdictionary.com/dictionary/english/periodic

As discussed in Chapter 1, prosuming is defined as the deliberate and simultaneous generation and consumption of solar power and, as we have seen, this involves certain knowledge, objects and shared meanings (Spurling et al., 2013a). This is not about the accidental use of solar power - as a project it requires the active participation of practitioners - mobilising elements and orchestrating practices and projects. As we saw in the last chapter, all the main interviewees became practitioners - when they performed the Prosuming Project they did it deliberately and simultaneously. What marked this stage was the fluctuation between performing the project at fairly regular intervals, and performing it intermittently. Thus many of the households performed the Prosuming Project during the weekday - orchestrating washing practices to its fulfilment as Val highlighted: "I used to put my washing on at night time because it was cheaper to do everything at night time, now I tend to do my washing during the day." Irene was another practitioner who had shifted her washing routines to coincide with solar power generation, however, like many of the others, this was not always consistent as she explained:

> Sometimes, I forget they're even up there...It's like, 'Oh yeah, the solar panels', or they get mentioned. So half the time it is a case of take no notice of the fact they're even up there... But then other times... try and save ourselves a bit of money where we can.

What was striking was that while the households realised they could use the solar power more effectively if they fitted their routines around its production, this was not always convenient. Some of the prosumers, like Harry, were not prepared to prioritise the Prosuming Projects given his busy daily path: "You can't make the most of it, unless you're like a recluse at home all day." However, what also emerged during the establishing phase, was that as important as the Feeding-the-Meter was for the families, it had to be balanced with other competing projects. Irene highlighted how if it was a sunny day, she prioritised her children rather than the washing, despite being able to save more money on the meter. As she said: "Washing was mainly done on miserable days because nice days we were out and about." Similarly, even after Ed discovered that work commitments had stopped him benefiting from using the solar power, he still maintained Sunday as sacrosanct and not a day for housework.

> The day we know we are definitely indoors without fail, in the week is always Sunday because it's our family day where we don't work, all of us and we are home and we normally, just, cook in the afternoon, only one meal and then that's that. And the other good thing is, being our church going day, we don't do things like laundry and things like that on that day, no. Just, a question of having a meal and then just, relax and everything like that.

As we have seen another issue during this phase was the role of the changing seasons. What arose was a tendency to align the Prosuming Project with good weather that invariably fell across summer and parts of the spring and autumn. As the next section highlights, this establishing period saw the emergence of seasonal periodic prosumers.

3.2 Establishing & Defecting

The establishing stage of the conceptual framework saw individuals move from the active adoption of the Prosuming Project, to starting to embed it in their daily paths, to varying degrees. This was, however, not always an easy path to choose. As discussed in Chapter 3, "not all practices are equal" (Shove et al., 2012, p. 78) and neither are projects. The secondary, voluntary Prosuming Project had to fight for time and space in the practitioners' daily paths given the competing demands from dominant projects and their practices. But by modifying and aligning itself with dominant projects, it managed to carve a space in the daily paths of the practitioners – at least for some of the time. For example, practitioners crafted the Prosuming Project to concentrate on those practices that also helped to deliver the Maintaining the Family Routines - namely washing, drying and ironing. This ensured a regular supply of clean school uniforms, but washed, dried and ironed using solar power. This in turn then supported another dominant project, Feeding-the-Meter, by saving money on laundry costs that could be used for other valued social practice. The social-solar synchronisation was the bridge between meeting the demands of the dominant projects and the Prosuming Project.

Additionally, by discovering that the Prosuming Project could not run without credit on the meter, did not mean that the households turned their back on it, but it did reduce some of the trust that had been initially built up during the adopting phase. This is important for a secondary, individual project as it had to continually prove its worth to busy practitioners. As Shove et al (2012) has highlighted, practitioners walk a line between performing and defecting.

While in the last chapter, the tensions between adoption and rejection were apparent, these did not suddenly disappear once the practitioner had, in effect, signed up to the project - if anything, they were magnified during the establishing phase. The decision to continue to perform or defect, was not just about "mobilising (or not mobilising) requisite elements" as the practitioners eventually achieved this during the adoption phase, it was primarily their "commitment, capacity and experience" to the Prosuming Project which invariably was tied up with the demands of family and institutional projects emanating from work (Shove et al., 2012, p. 78). A practitioner may have wanted to support the Prosuming Project, but their capacity to find space for it within their busy daily paths, in part depended on other demands including from dominant, institutional projects. As Ed highlighted, even fitting in the social practice of laundering can be difficult within a busy path dominated by work and family institutional projects:

> We do our laundry maybe twice or three times a week. Yeah because as I said we are a very busy family, me and my wife work…, so we just try and take the opportunity to do our laundry.

For a number of households, the school holidays had an impact on routines and in turn this affected the Prosuming Project. However, what was more significant was the decrease in daylight hours and seasonal changes and the diminishing effect this had on social-solar synchronisation. Frankie in particular lost confidence in the Prosuming Project as the seasons changed from autumn to winter. Her mantra - sun equals power - did not serve her well as the seasons changed. She gave up prosuming over the winter and joined Val, Ed and Harry as seasonal periodic prosumers.

A defection

Maggie however did not remain as a periodic prosumer. Over the winter she defected from the Prosuming Project. Like Frankie, she had started out an enthusiast for the Prosuming Project; even before she received the panels she had lobbied the council to invest in them:

> At a council event someone asked me what the council could do to save money, and I said 'We'd like solar panels.' But obviously this idea was thought of before I said that, and then the next thing I know I've got a letter saying we'll get solar panels.

After getting the solar panels installed, she urged others to purchase them and was pleased with the savings she had started to make over the summer. Yet even at this early stage, Maggie started to express reservations about the project. She was frustrated that the solar power could not be accessed independent of the grid, as well as the lack of clear information from the solar installers. But what stood out, compared with the other households, was Maggie's reluctance to adapt her Maintaining-Family-Routines Project to fit with the solar project: As she said:

> I don't think about the [solar panels] really. If I'm going out, I go out. Whether it's sunny or whether I need to do the washing or whatever. The washing can always be done at night. I have to pay for it, but oh well. Don't get sun at night much do you?

The link between the Prosuming Project and the Feeding-the-Meter Project was also weak, compared with the others households. For a year, Maggie had been receiving a disability allowance for her daughter that had made a significant difference to the household budget. At the time of the study it meant the Feeding-the-Meter Project was not so significant in her life, although she realised this could easily change again. As she said: "I mean ... the disability money I get for my daughter could stop tomorrow. You just don't know. I mean I'm lucky. I say I'm lucky, but I'm not, because the way she is..."

As a practitioner, prosuming had become associated with yet another demand being made on her daily path, but this time from a secondary project that could easily be abandoned. Maggie resented

the time restrictions the project imposed on her. As she said: "No, I'll do …[the washing] when I'm ready to do it, when I feel like it..."

At first glance, it appeared that Maggie had plenty of time to adapt certain social practices to coincide with solar generation and become an active prosumer. Her child was at school and, as she had no external work, she was at home a lot of the time. Yet, like the other parents in the study, there was still a sense that she always had too many practices and projects to fit into her daily path. As she explained: "It's just like…busy. Everything is busy. Always like when you are at home, things always need to be done." As I got to know Maggie and gained her trust, she shared why she felt constantly busy:

> I have to be on call for the school whenever they phone me. I've got to be there. I can't go anywhere far in case they phone me because of her difficulties at school...It's a nightmare. I [recently] went to go out ... I got halfway ...[and then] had to turn round and come back to go to the school. Yeah I've had loads on... it's not been like normal, I've had two funerals to attend like in less than a year, it's not been like a normal year so far has it?

Given the physical and emotional demands on her time, it is not surprising that a secondary project such as prosuming, was barely on her radar. As she said: "I don't know. It's like so much going on, so much to think about, solar panels and electricity is like the last thing I'm thinking about. I do things because they need doing not because the sun's out. That's it."

3.3 A summary of individual pathways

Table 7 below summarises the pathways for each household during the establishing stage:

Table 7 Establishing: Periodic Prosumers – a summary of individual pathways

Irene	Irene concentrated on orchestrating her laundering practices to the Prosuming Project. What also stood out during this period was how she deferred to her husband Tony as the expert even though she was the main practitioner in the household. While Irene was keen to perform the project because of the financial savings she was beginning to make, it was initially hard to keep to the new routines - particularly with variable weather. However, as the months elapsed and autumn turned to winter she began to further embed the Prosuming Project in her daily path, as she saw the benefits it was making to the household and she segued from establishing to the committing stage.
Frankie	Frankie loved being a prosuming practitioner and, where possible within her busy daily paths, carried out regular performances. Washing and drying were the main practices that she orchestrated to the Prosuming Project. Her performances were reinforced by the significant financial savings she was seeing - over the summer reducing from £30 a week on the electricity prepayment meter to just £10 in some weeks. Yet despite her fairly regular performances, as winter set in in they became intermittent and then ceased altogether. Her mantra - sunshine equals solar power - no longer served her well and as a result she stopped orchestrating her laundering practice to the project, becoming a seasonal periodic prosumer.
Val	Of all the practitioners, Val was the most profoundly affected by the Prosuming Project during the establishing phase. When her husband left, so did the security of being able to know she could afford to use electricity without constantly checking the prepayment meter. But this changed once she had adopted and started to establish prosuming in her daily path over the summer. The money she saved on her electricity costs gave her extra money in her pocket - she no longer regularly ran out of cash the weekend before her benefits arrived. Additionally, the Prosuming Project also meant she could use the solar power to increase her performance of washing, as well as adapt the practice. Thus she could wash her children's clothes more frequently, as well as having separate washes for white and coloured items. Val assumed she would be able to continue to perform prosuming over the winter, and was disappointed when she stopped saving money on her prepayment meter. Given this, she stopped adapting her laundering practices to daytime performances. Initially, Val was negative about the experience and frustrated by no longer saving money, but this started to change once spring arrived and she started to prosume again. Val remained a periodic seasonal prosumer.
Barbara	Barbara started to prefer her new daytime routines as it gave me her time in the evening to relax rather than feel she had to undertake certain domestic tasks. In terms of the opportunistic use of the solar power, she was tempted to use her tumble dryer more often because of the convenience. But Barabar also felt uncomfortable using it on a sunny day because it did not feel right - frugality ran deep. Similarly she would never run the washing machine with a half load. Even with free solar power she saw this as a waste of resources. Like Irene, Barbara increasingly embedded the Prosuming Project into her daily path and moved from the establishing to the committing stage.
Maggie	The more the weeks went by, the more Maggie struggled with being a prosumer. She increasingly saw it as an infringement of her time and another task to undertake to fit into her busy daily path. During the establishing phase she grew to resent the Prosuming Project - why should she stay in to do the washing on a sunny day? Months later, after she had defected from the Prosuming Project, she shared in the interviews just how difficult her life had been during this time. Institutional projects were a heavy load on her shoulders particularly trying to manage the educational difficulties her daughter was facing, as well as wider family issues. There was simply no space in her daily path for the secondary Prosuming Project - neither physically nor emotionally. Harry instead took on the role of project practitioner for the household and yet he too was not comfortable committing to it given the different commitments in his daily path. While Harry did not defect, he took an extended break over the winter as a periodic prosumer.
Zoe	Although Zoe had a slow start to being a prosuming practitioner she warmed to the project as she developed her skill set. She stood out amongst the households for batch cooking during her day off. She not only saved electricity but also food costs as she would buy from a local market. The Prosuming Project also started to attract the interest of two of her older children - in particular Tracey who could see the financial savings they were beginning to make as a household. So an informal partnership developed whereas Zoe would put on a wash before she went to work, and her daughter would finish it off in the tumble dryer. Both Zoe and Tracey found themselves developing shared performances that helped not only fulfil the Prosuming Project but also meet some of the objectives of the Feeding-the-Meter and Maintaining-Family-Routines projects. They both moved from establishing to the committing stage.
Ed	During adoption, Ed had an extra visit from the solar installer to check his system was working. The installer gave him more tailored information about how to use the solar power including the advice that an old empty freezer was wasting electricity. Ed also realised that he was not seeing the benefits of the power as neither he nor his wife Jane were rarely around during the day due to shift work. Ed used the new knowledge from the solar installer to start a conversation with his family about household energy practices. He realised that one reason why the electricity bills had become so high, was that he had a number of family members staying for a few months so the electric cooker and washing machine were being heavily used. Following discussions with his family, they all said they would try and adapt their practices to take advantage of solar generation during the day and be even more mindful of not wasting energy. For Ed the Prosuming Project became more closely associated with energy saving rather than simultaneously producing and consuming solar power, although like a number of the others, Ed still saw prosuming as a seasonal project.

4 CONCLUDING SUMMARY

This chapter builds from the adopting stage by highlighting the continued importance of the practitioners mobilising elements and orchestrating practices and projects to the performance of the Prosuming Project. But even though the transition between adopting and establishing was more a continuum than a cliff edge, there were some significant differences. Firstly, the elements were largely stable during the establishing compared with the adopting phase. However, what this phase also highlighted is that elements are not static and even though practitioners had mobilised a set to adopt prosuming, new ones still emerged as this secondary project more closely aligned itself with the Feeding-the-Meter Project and the Maintaining-Family-Routines projects. Secondly, this phase also saw these two dominant projects becoming more active in both helping to strengthen the hold of the Prosuming Project of the daily paths of practitioners, but also undermining it when they no longer saw the benefits to their own objectives. This was further complicated by the role of synchronicity, finances and the changing seasons.

What also emerged was how the Prosuming Project worked hard to meet a range of family needs through aligning itself to key objectives around prioritising routines and saving money. However, the Prosuming Project also lost its footing in daily paths when faced with a change in domestic rhythms during school holidays, as well as seasonal changes. This in turned undermined its alignment with the institutional projects. For example, as the weather changed, so less solar power was generated and with that less money saved.

But the households were not simply observers of this process. During the establishing phase, practitioners thus chose to mobilise elements, which were helpful in their development as a prosumer, as well as orchestrating practices and projects to the Prosuming Project when it suited them. They were far from passive carriers of this project.

What also emerged was a divide between the practitioners. For those who primarily saw the project in terms of responding to a solar cue, the end of British Summertime meant that they took a break from performing prosuming over the winter. For others who were more flexible in their response, they continued to embed the project into their daily paths to see what would happen over the winter. They turned from periodic to transformative prosumers as they moved to the committing phase.

CHAPTER 9

COMMITTING TO THE PROSUMING PROJECT

1 INTRODUCTION

The **last chapter** highlighted how although the set of elements for performing prosuming was fairly stable, as practitioners began to establish the project into their daily lives, they needed to mobilise additional ones. What also emerged was a more complex relationship between prosuming as a secondary, voluntary project and dominant, institutional projects, set against a backdrop of synchronicity and financial issues. The phase was also shaped by the threat of practitioners defecting from the project – with one doing just that. The rest became either seasonal periodic prosumers or segued into the committing stage.

This chapter will address the fourth subsidiary research question: **What are the key features of the committing stage of a Prosuming Project for social housing tenants?**, as well as contributing to the overarching research question, "How and why does prosuming evolve for social housing tenants?" The chapter is guided by the third stage of the conceptual framework – committing. Its focus is on how a new vocabulary of elements emerged as practitioners committed to the Prosuming Project. It also explores how a transformative process took place both for practitioner and project.

In more detail:

Section 2 explores how as practitioners committed to prosuming, they needed to develop a new vocabulary of elements to ensure an all year round performance. It also explores Shove et al's (2012) assertion that as practitioners cross thresholds, the tensions between performing and defecting reduces. The key critical threshold that emerged from this study was the knitting together of the Prosuming Project with the two dominant, institutional projects Feeding-the-Meter and Maintaining-Family-Routines. Additionally, two other thresholds were identified: the importance of internal and external rewards, and the innovation potential of the Prosuming Project.

Section 3 explores the practitioners and their pathways and the development of transformative prosumers. It highlights two areas: challenging conventions and embodying the project.

Section 4 is an additional section from the other two previous chapters. Here it looks at the 'chrysalis' of a new project that is emerging – the Energy-Shifting-Storing-Sharing & Saving Project.

Section 5 concludes the chapter.

2 MOBILISATION & ORCHESTRATION

2.1 Vocabulary of elements

During the initial adoption phase of the conceptual framework, individuals had to access a set of elements (Hui and Spurling, 2013) to enable them to perform the Prosuming Project. This involved mobilising additional elements, such as the prepayment meter, as well as the transmutation and circulation of others. By the establishing stage, the practitioners had mobilised the elements they needed to start embedding the Prosuming Project into their daily paths. However, as their performances developed, they needed additional elements to add to their set and a number of these came from two dominant, institutional projects: Feeding-the-Meter and the Maintaining-Family-Routines.

This evolution of elements continued and accelerated during this committing phase. Hui and Spurling urge practice scholars to be open to elements evolving rather than assuming that "a particular fixed combination of knowledge, skill, and material is brought together each time a practice is performed" (2013, p. 4). They refer to practitioners developing a "vocabulary of elements" that "involves the accumulation, removal, rearrangement, replacement and innovation of those elements during a sequence of performances over time" (Ibid.). Below, I discuss how the three core elements: materials, meanings and competence, further evolved into a vocabulary during this third and final stage of the conceptual framework.

2.1.1 Materials

While the use of the prepayment meter for the Prosuming Project was significant for households during the adopting stage, practitioners came to rely on it less during establishing. As they started to perform the project, they developed an embodied knowledge of what was a good performance or not. However, as we saw in the last chapter, the changing seasons proved a difficult time for a number of practitioners, who in the end became seasonal periodic prosumers by withdrawing over the winter months. Their know-how did not equip them for prosuming within the context of decreasing daylight and sunshine. However, for those practitioners who committed to prosuming, they addressed their uncertainties by keeping to their daytime routines but also, in part, returning to the familiar Feeding-

the-Meter Project. For example, as winter set in, Irene reverted again to recording her domestic routines against the prepayment meter as she had done during the adoption phase:

> I write it all down, every day on what we…used, what the oven's been on today, or what the weather's been like or, sometimes the lights on early. Because I write it down, I … can see the savings and I can show them to other people, 'Look at this, we've saved this much!'

Both Barbara and Zoe also continued to keep an eye on the prepayment meter. For example, Zoe noticed how the cost of her weekly electricity bill had started to rise as winter set in, but despite the reduced daylight hours and weather she was still saving some money: "We've been putting £25 back on. So, I've been saving at least £5-6 a week." But it was the installation of solar energy monitors, by the social housing landlord, in the second half of the winter that made a significant difference to the committed prosuming practitioners. The monitors worked by emitting varying coloured lights to alert households as to the status of their power generation and consumption. For example, when the meter glowed green it meant that more power was being generated than consumed. All the committed practitioners welcomed the device as another element to help them improve their performances of the Prosuming Project. This was not generally the case for the seasonal periodic prosumers, although Frankie was an exception as now discussed.

2.1.2 Meanings

The main difference between the establishing and committing stages of the Prosuming Project was the emergence of an element that defined it as an all year round activity. Irene, Zoe and Barbara had started to discover through regular performances of prosuming over the winter, that it was not a seasonal project. As Barbara said: "I've been saying, 'You're going into the winter months so you're not really sort of going to benefit so much as you would in the summer'. But, it's not been too bad." For her and the other committed practitioners Zoe and Irene, the solar energy monitor simply confirmed what they had already discovered for themselves - the Prosuming Project could be performed across the year.

For Frankie, however, the energy monitor was a revelation. As discussed in the last chapter, she had been highly disappointed with the Prosuming Project at the start of the winter and had decided not to perform over this period as she thought it was a waste of her time. The solar energy monitor not only challenged her understanding of prosuming, it also gave her the evidence that she had not managed to elicit from her prepayment meter, that the project could be performed all year round:

> It confirm[s]... because I didn't really pay attention to my [prepayment] meter in the winter months because I personally didn't think that I'd benefit from anything... once I got that [solar monitor] and you can see it changes colour and you know when to use [the electricity].

2.1.3 Competence

Competence was inextricably bound up in this process of commitment to the Prosuming Project, and it too was transmuting. The prepayment meter helped the three original committed practitioners - Irene, Zoe and Barbara - keep a close eye on how much they were saving over the winter. This contributed to further building up their know-how, particularly in the case of Irene who intensified her monitoring practice:

> So I check it the same time every day so I learnt that [over] 24 hours that's how much has been used. And that helps me. The fact I've got to go check the electricity anyway to see how much is on there and then... I write it down instantly what's left on. And then I'll work out how much has been used. Because I do that, that helps ...[with] what I'm doing in ...[the] day time...I think it's just the routine I've got myself into checking the electricity that's really, really shifted my bum along.

As Shove et al points out, monitoring and 'doing' can start to morph together and sometimes it can be difficult to separate out one from the other (2012, p. 99). For Irene it helped her develop an intimate knowledge of the relationship between the Prosuming Project and Feeding-the-Meter Project. This resulted in her significantly extending the orchestration of practices under the Prosuming Project not only laundering but also cooking, lighting, and even some leisure practices by ensuring electrical items were turned off at the wall. Even before receiving her solar energy monitor, Irene discovered that she could save more electricity by running the tumble dryer and the washing machine sequentially, rather than simultaneously. As she explained: "If you're using the washing machine and tumble drier at the same time... then you don't need a colour monitor to tell you that it's going to be costing more, or use a lot of electricity".

But for the other two committed prosumers, whilst the prepayment meter was useful for reassuring them that they were still saving some money over winter, it was ultimately reactive: offering insights into electricity costs after the social practice had been performed. Over the winter, with the reduction in solar generation, it had become a much cruder device. It was much harder to see the relationship between adaptations to social practice and the rate at which credit disappeared on the prepayment meter because the savings were much smaller.

But the arrival of the solar energy monitor, offered the opportunity for practitioners to combine this real-time knowledge about generation and consumption of solar power, with the know-how that they had built up from past performances. It also offered a more reliable visual cue than sunshine, as Barbara highlighted: "It's more useful in the winter because …it's not bright and sunny. When it's bright and sunny it's common sense that [the solar panels are] working, but in the winter you're not quite sure." But out of all of the practitioners, the solar energy monitor transformed Frankie the most

as a practitioner. She swiftly progressed from being a seasonal periodic prosumer, to an all-year round committed prosumer, with the requisite competence required. As she explained:

> The monitor has made a hell of a difference because I mean... it just tells you. It's like it speaks to you... 'Go on, go and put a load of washing on, and go on, go and do this, go and do that, you're saving you're generating, you're not generating!' So it does, it does tell you.

She was the only seasonal periodic prosumer to start using the solar energy monitor regularly - in two cases it was not even plugged in.

2.2 A critical threshold – 'knitting' together of projects

As we have seen across the last two chapters, there was a tension present between practitioners adopting and rejecting a project, along with performing and defecting from it. However, as Shove et al point out, such tensions are not inevitable as practitioners commit to their performances and "critical thresholds are passed" (2012, p. 71). Was such a threshold in evidence in the Prosuming Project as practitioners committed to it?

Undoubtedly, what stood out across all three stages was the importance of the relationship between prosuming as a secondary, individual project and two dominant, institutional projects - Feeding-the-Meter and Maintaining-Family-Routines. As Chapter 2 highlighted this has not always been a positive relationship particularly as social-solar synchronisation and financial savings reduced, loosening the ties between prosuming and the dominant projects. And yet, this is far from the end of the story. By committing to prosuming, practitioners crossed a threshold whereby prosuming became more closely knitted with Maintaining-Family-Routines and Feeding-the-Meter and in the process changed the dynamic from tension to cooperation.

For Irene, Barbara and Zoe, along with her daughter Tracey, the link between the Prosuming Project and the Maintaining Family Routines not only remained but strengthened over the winter. Although, Zoe and Tracey did have some time out from the Prosuming Project over the Christmas period, they returned as practitioners once the term time rhythms reasserted themselves. However, at the outset of committing to the project, none of these practitioners knew for certain that it could be performed all year round. For example, this was not mentioned in the information sheet supplied with the solar PV system. They potentially could have surmised this, as some solar installers had said that the panels can work in cloudy conditions, but the overwhelming message was that all the practitioners came away with various versions of sunshine equals solar power.

Despite the winter being unknown quantity, the three practitioners simply kept their performances going and monitored them through the prepayment meter. For example, Barbara continued to perform laundry practices during the day, whatever the weather, because she had established it as a routine. As she said: "I mean like today, I'm not going to think, 'Oh it's not very nice out there, I'm not going to put my washing on'. It needs to be done." This new routine was reinforced by Barbara preferring to carry out laundering during the day as it kept her evenings clearer, in addition to any savings that might be generated. This in turn helped to bind the Prosuming Project closer with the Maintaining-Family-Routines Project as the latter preferred regularity over inconsistency however little the savings.

Equally, Zoe also continued her 'bake days' across much of the winter because it too supported the Maintaining-Family-Routines Project. Even if very little solar power was being generated during these cooking sessions, she was still maintaining this new routine and fulfilling her role as a 'good' parent by preparing food in advance for her teenage children. The solar energy monitor reinforced the embodied knowledge the performers had been building up over the winter by giving them real time information on energy generation and consumption.

But it was not just family routines that gained from the all year round commitment by prosuming practitioners, the Feeding-the-Meter Project was also an important beneficiary. For most of the households who committed to the Prosuming Project, the financial savings were not large over the winter compared with the summer. When Zoe was interviewed in December, she reported savings of around £6 a week by continuing to carry out key domestic routines "...during the day... whereas normally I'd do [them]...in the evening, and leave the tumble drier on overnight and come down and fold it." But for households who at times can struggle to keep their prepayment meter in credit, a few pounds can make a significant difference to their lived experiences - not least in the winter with additional heating and lighting costs. Irene felt strongly that she did not want to lose the financial savings she had been making over the summer, as they had been so important to family life. This was an important influence on her becoming more systematic in monitoring the prepayment meter. The resulting insights helped mobilise new competence elements for other social practices and achieve significant financial savings for the Feeding-the-Meter Project, even surpassing those she was making in the summer. As she explained her weekly electricity cost was being reduced by around fifty percent across the winter:

> So last year it would be between £20 or £30 electric …[each week over] the winter months and now this year we've used between say £11 and £15. Come January, Feb that has been £11, £12. Get to March and it starts brightening up and getting really, really lovely and it's come down a lot more still...one week we did £7.... because the weather was just so, so lovely, it was really, really sunny all week.

What Irene also demonstrated was that even in the depths of winter there was potential for prosuming to not only support practices that relied on electrical appliances, but also those that drew on gas which had its own prepayment meter:

> We're going to start putting the savings we're making on the electricity onto the gas... When it's freezing cold and you want to put the heating on, you have to worry about how much is actually on the gas, is it going to last, it's not going to last. So we're going to start putting the extra that we save on the electric onto the gas so ...it will be nicely topped up and we won't have to worry about it.

The knitting together of projects as a critical threshold, reflects a wider issue raised by Shove et al (2012) about the consequence of institutional projects dominating daily paths. As they write, "lives revolve around a handful of 'dominant projects'…[which] are influential on several fronts at once. In concentrating priorities and energies they focus time and attention in some directions and not others" (Shove et al., 2012, p. 79). For prosuming to secure a strong foothold in daily pathways, practitioners needed to not just mobilise elements and orchestrate practices to its fulfilment, but also look to how this voluntary project could support the dominant projects of Maintaining-Family-Routines and Feeding-the-Meter. They did this by ensuring that prosuming mobilised elements from the dominant, institutional projects, but also that this was also a two way process. Thus, as we saw in the case of Irene, her Feeding-the-Meter Project improved from the competence elements she mobilised from the Prosuming Project. Without that close binding, the practitioners may have found themselves struggling to commit to the Prosuming Project and end up back on the path to the establishing stage.

2.2 Other thresholds

As prosuming and the dominant projects became more closely bound together, the tensions between performing and defecting reduced. But even when secondary and dominant projects are closely knitted together, this is still not a guarantee that space will be found in a daily path. What emerged from the data were two other thresholds, not as critical as the knitting together of projects, but still important in encouraging practitioners to assert their authority in making sure that prosuming was firmly fixed in their daily paths. These were the role of rewards and innovation, both of which reflected social practice literature (Shove et al., 2012).

2.2.1 Rewards

Shove et al highlight the importance of internal rewards to maintaining commitment to a practice. They write: "being an excellent teacher is satisfying in and of itself and not (only) because this role attracts public recognition or a good salary, these being external rather than internal rewards"

(2012, p. 75). Yet the findings from this study were more complex than this example. What emerged initially during the adoption phase was the importance of saving money. This did not suddenly disappear in the committing stage. If anything, it became more important to practitioners during the committing stage as they tried to find ways to continue to achieve at least some financial savings over the winter, and reduce their need to keep trading one valued social practice over another. This cannot be underestimated as highlighted by Irene:

> We're not having to put as much on [the prepayment meter] as we normally do... so I'm spending it elsewhere. So if the children need something, it's actually not that much of a problem. My son needs new shoes...I know it will come from the money that I've saved.

Whether saving money counts as an 'external' or 'internal' reward is a question beyond the scope of this thesis, but what was apparent was how the financial savings brought with it a wealth of benefits even beyond the material ones. For some, the Prosuming Project helped reduce the stress levels associated with the Feeding-the-Meter Project, as highlighted by Irene:

> Where the electricity's concerned ...the amount of times you do , "Oh is it going to last, is it going to last?"...In the stress levels... it works wonders because...I know it's going to be fine until tomorrow... I haven't got to panic about putting the emergency on.

Additionally, for Barbara, the close relationship between the Feeding-the-Meter Project and the Prosuming Project offered her more control over her energy use:

> Because you're aware of what you're doing, you're in control of it more. Because you put £10 on Monday, and then say by Thursday you go and check it and it might be £7.56 and you think ok, I've used durdurdurduh, and then you put another £5 on. And you're more aware of what you're doing.

What was also apparent was the satisfaction that the practitioners received from supporting their families through their commitment to the Prosuming Project. This was most manifest in Irene who had started out as lacking in confidence around how energy was used in the home - deferring to her husband Tony, as the expert. But within just a few months this had significantly changed, as she not only developed new skills as a practitioner of the Prosuming Project, but also with the dominant Feeding-the-Meter Family Project:

> Yeah, because I mean, I mean Tony knows all his stuff ... [but] I check the electricity and I write all down what we do in a day...cos it's me doing most of the day to day chores...So yeah, I've learnt a lot and I've realised that just because it's a bit overcast they still work, they draw in anything they possibly can.

The importance of different rewards was reflected in a number of the studies reviewed in Chapter 2 (Abi-Ghanem and Haggett, 2011; Dobbyn and Thomas, 2005; Ellsworth-Krebs and Reid, 2016) . In

particular, how microgeneration can offer not only "exchange value" (financial rewards) but also "use values" (enjoyment) (Ellsworth-Krebs and Reid, 2016, p. 1996).

2.2.2 Innovation

Hui and Spurling (2012) argue that for longevity, a practice should offer chances for development from practitioners. They write, "running out of opportunities to develop new skills and knowledge does not necessarily terminate an individual's career, but limits the possibilities for performance and its related internal rewards, making ongoing commitment less likely" (2013, pp. 5-6). Shove et al make a related point that, "practices are, perhaps ironically, better able to retain commitment when they afford scope for innovation" (2012, p 75).

Innovation is a concept with a large body of work attached to it that is beyond the scope of this thesis. However, given its relevance to commitment thresholds, I draw on Pantzar's and Shove's definition of social practice innovation to include a "new combination of materials, images and skills" (2010, p. 458) as demonstrated in their study of Nordic walking:

> Our first move was to suggest that new practices consist of new configurations of existing elements or of new elements in conjunction with those that already exist. From this point of view, innovations in practice are not simply determined by the generation of new products, images or skills. What really matters is the way in which constituent elements fit together (Shove and Pantzar, 2005, p. 61).

Warde refers to the innovation potential of practitioners. He writes how, "performances in the same practice are not always the same" as they "contain the seeds of constant change… as people in myriad situations adapt, improvise and experiment" (2005, pp. 140–141). This has been illustrated in this study. For example, the prepayment meter was adapted so practitioners could use it to experiment with prosuming, and laundering was adjusted to accommodate social-solar synchronisation. As the committed practitioners consolidated and extended their prosuming activities, they started to innovate further by redefining the Prosuming Project. For example, in Irene's case it was no longer primarily focused on shifting energy, but also about saving energy:

> Before we had the solar panels…in the wintertime…there was so many things going on at once. Washing machine/tumble drier was always on at the same time. The cooker would be on, as and when we needed it…So having the solar panels has made us more aware of…when we're using it, and what times and doing more to turn the electricity off. And we stopped putting things on that we don't need on. There doesn't need to be three TV's on in the house. And there doesn't need to be every light on in the house, so because of the solar panels we started turning more and more off, and being more aware of ourselves and what we're using needlessly. Stopping it basically.

As Warde writes: "Practices are not hermetically sealed off from other adjacent and parallel practices, from which lessons are learned, innovations borrowed, procedures copied" (2005, p. 141). This was undoubtedly the case in the Prosuming Project as committed practitioners became excited as to the potential that the Prosuming Project offered them in transforming other areas of their lives.

3 PRACTITIONERS & PATHWAYS

3.1 Transformative Prosumers

Practitioners and the projects and practices they orchestrate, are often in an intimate daily dance together (Shove et al., 2012). This, as discused in the last chapter, is not always harmonious - practitioners can walk away when it is not working for them, or decide to take a rest as with the seasonal periodic prosumers. But for those practitioners that commit, as their experience and skills build with daily performances, so the dance starts to become easier:

> As people become committed to the practices they carry, their status changes, sometimes to the point that they become that which they do (Becker 1977). The practicalities of becoming what Lave and Wenger (1991) refer to as the 'full practitioner' and the sequences and stages involved vary from one practice to another (Shove et al., 2012, pp. 70-71).

All four committed practitioners underwent different degrees of transformation in a matter of just a few months. The dictionary definition of transformative is "causing a marked change in someone or something".[14] All four committed practitioners became transformative prosumers – although in each case it looked slightly different..

For Barbara, prosuming transformed her weekday evening. She was no longer finding herself undertaking lots of domestic chores as she had shifted many of these to the daytime to capture any solar power that was being generated. She loved this new rhythm to her daily path, and would not give it up even if she found she was not saving money through the Prosuming Project. For Frankie, the transformation could be seen in her enthusiasm for embracing the Prosuming Project into different parts of her daily path:

> Because I've realised how much money I'm saving so I want to save that on my water, I want to save that on my gas I want to save that, you know, you want to save it on everything…You can save it like people collect coupon's…That's what people do they collect things, we're just trying to stop the kids from using too much electricity. If it's free, they can play their computers and do what they need to.

[14] https://en.oxforddictionaries.com/definition/us/transformative

But arguably it was Zoe and Irene's households who underwent the most dramatic transformation as illustrated in the next section.

3.1.1 Challenging convenience and cleanliness

As Zoe increasingly committed to being a prosumer, her laundering practices started to transform. Before the solar panels arrived, laundering took up a lot of space in Zoe's daily path as her three teenagers, "like to change their clothes after five minutes. Or they leave their clothes on the floor when they are clean and we have to wash them. So yeah, the washing machine is going all the time." It was not uncommon for up to four loads of laundering to be washed and then tumble dried in a day, as the family had no indoor or outdoor washing line. As Zoe's daughter Tracey explained, the tumble dryer could take up to two hours to run its cycle, so "you get up, you stick it on and it's on all day." However, as Tracey committed to the Prosuming Project she began to question their drying practices, irrespective of whether the tumble dryer was running on solar power or not:

> Well just because it's free doesn't mean you've got to go crazy with it sort of thing. I think now we have got the solar panels...[and] it's nice outside, we can stick some washing out there, we haven't got to use the tumble drier.

The status quo remained until the tumble dryer stopped working after Christmas. This event provoked a family discussion as Zoe explained:

> When the tumble drier was on and even with the solar panels it was taking a bit [of energy], because it was heat-generating thing. So, yeah, we just decided that we wouldn't get it fixed and we'd use the launderette.

The decision was made easier as Zoe had discovered a local laundrette that was reasonably priced. However, Tracey was keen for another solution to their drying practices – using the sun directly:

> Mum put a washing line out our back. And I said to her, there's not much point in having one because you can't even get a load of washing on it. So we've got three washing lines going all the way across the garden.

With the new material elements in place, other elements started to shift and in the process challenged the laundry practices within the Maintaining-Family-Routines Project as Zoe explained:

> I have made the kids... get off their bums actually to go down the launderette and do it, so they know what it is I've got to do...I think that has made them think twice. So I say to them, 'No, no, if it's not in the washing basket it don't get washed.' So I just kind of look in the bedroom and if it's on the floor just shut the door.

For Tracey in particular, the replacement of the tumble drying challenged her laundry practices by rethinking the role of cleanliness and convenience (Shove, 2003):

> Well ...after the clothes were washed, you'd throw them upstairs, they'd end up on the floor and you'd think, 'Ah, I'll just throw it in the wash again.' Now you sort of go through it, 'Is that clean? That's clean, don't have to wash that again.'...Rather than just putting stuff in the washing machine. It's like, 'Does that jumper need to be washed?' Could it have another day's use as it is a lot more hassle to [wash and dry] now to be honest."

3.1.2 Embodying the project

Shove et al argue that in crossing thresholds, the practitioners themselves can start to embody that commitment:

> More commonly, repeated performances bind practitioners and practices together in more subtle ways. Regular trips to the gym have a noticeable effect on the muscles, strength and shape of those who devote themselves to body-building…new levels of practice come within reach as competence develops (Shove et al., 2012, p. 71).

While this may be a compelling argument for a doctor, DIY enthusiast or even a body builder (Shove et al., 2012), it is more difficult to see how this translates to the much more mundane domestic practices of washing or drying clothes that form an important part of the Prosuming Project. And yet, arguably, all four committed prosumers started to show signs of becoming "what they do" although this was most obvious in Irene (Shove et al., 2012, p. 71).

Irene also started to challenge and then transform her drying practices. While she had started out with a washing line, it was often more convenient to put her wet laundry into the tumble dryer rather than having to keep a constant eye on the weather, particularly given the need to ensure a constant supply of clean school uniforms. But as Irene increasingly committed to the Prosuming Project, the reverse started to happen: she started to use the tumble dryer less and the washing line more when the weather permitted. This occurred even though she could potentially have run the tumble dryer with free solar power. Similar to Tracey, Irene also started to mobilise elements that meant prosuming was not just about load shifting but also conserving energy, including solar:

> Because it's like ...[I] get up in the morning, do my bits and pieces, go check the electricity and see how much is on there…The things that we're doing to save ourselves money - switching things off at night time that aren't in use, switching things off in the day time that aren't in use... and of course the washing and drying. As the summer's coming up it will be even more on the line drying, rather than in the tumble drier.

As her skills increased as a prosuming-practitioner, she added other meanings and competences to her shifting vocabulary of elements. Thus, under the direction of the Prosuming Project, the practice of line drying was no longer just about sticking clothes in a machine, but letting them "dry naturally". Line drying not only became associated with freshness but also the enjoyment of being a Prosuming Practitioner: "I'm also getting outside in the sunshine and it's enjoyable, so in a way we're getting two…[benefits] from it." Irene even started equating the Prosuming Project and its line drying

practice to being a good mother, by resurrecting practice memories that she experienced as a child (Strengers and Maller, 2012). She said: "I like hanging washing on the line. It's like a motherly thing to do, so, because I like doing it, I'm happy to do so...I don't need to just shove it in the tumble drier and off we go." Instead the many internal rewards Irene got from line drying quite quickly outweighed the convenience of tumble drying - it felt a good thing to do:

> It's fun when you're getting outside, you're going in the garden and obviously my son can go out in the garden and play and he'd be running around, or, just popping the washing out on the line.... obviously it can be quite time consuming, you've got to get them out of the washing machine, you've got to take it out, you've got to hang it all up, but it's, it's not too bad. It's not a big sacrifice to make just to save yourself some money. It's not bad at all. And I actually enjoy doing it, so. That makes it easier.

Given her commitment to the Prosuming Project Irene even resolved the issue that her children did not like the texture of the air dried clothes by innovating her practice by combining air and tumble drying with both powered by the sun:

> The sun is ...drying my clothes for free...Because even ...when I bring them back in, and put...the tumble drier on for at least 10-20 minutes to soften up, that tends to be still free as well...It ...comes in off the line all stiff like cardboard...but, yeah, 20 minutes in the tumble drier ... it just softens it all up.

Thus what also emerged was an improved sense of well-being that reinforced Irene's journey on embodying the Prosuming Project. Rather than winter always being a big worry because of the cost of energy during this period, Irene embraced the season as she developed skills that enabled her to save even more electricity than during the summer. She did this by being creative in how she performed many domestic practices. Not only did Irene continue to carry out her laundering during the day to capture any solar power that might be generated, she adapted other social practices. For example, Irene realised she could maintain the children's routines but save on the cost of using an oven by all eating together, rather than having a separate later meal time for adults. This in turn had a profound impact on the Feeding-the-Meter Project as she explained:

> Since Christmas they seemed to have no end of trips to come along and they all seem to be wanting paying for. And one off me son's just gone through a new pair of trainers, a new pair of school trousers last week…But that extra money is coming from that little £10 or £15 I got left in me purse that would have actually gone on the electric... It's ok, it will be fine, we can pay for that, that, we can do that with that.

And with this knowledge came two emotions. The first a sense of relief as the daily stress Irene was under was reduced a little as she knew the prepayment meter was not suddenly going to run out of credit. But it also helped her develop confidence in her skills in managing the Feeding-the-Meter Project over winter - a particularly difficult time because of the extra cost of heating and lighting the

house. She no longer assumed that Tony, her husband was the energy expert; she had taken on this mantle in the household.

3.2 Committing & Transforming

As we have seen in the previous two chapters, there are inherent tensions in the first two stages of the conceptual framework, between adopting and rejecting the Prosuming Project, followed by performing or defecting. However, this constant straining between two polar positions started to shift as secondary and dominant projects became more closely knitted together. This of course, does not mean that practitioners necessarily stay committed forever. They may reduce their commitment because of other preferred secondary projects, or increased institutional demands, for example, having a baby. As Shove et al point out "taking one path and not another configures opportunities for the future. Having children, changing occupations or moving to another country all have such effects" (2012, p. 78).

So even transformative prosumers can choose to step back from committing and return to becoming periodic prosumers, or even choose to exit from the project as highlighted in the conceptual framework in Figure 1 (Barley, 1989). Changing direction and commitment is not so unusual as, "childish ways are put aside, as new loves are found and as bodies gain and lose strength and agility" (Shove et al., 2012, p. 78). But the difference between this final stage, and the previous one, is that defection is not hanging over the committed practitioner in the same way it is during the establishing stage.

We also saw in the last chapter, as the solar generation diminished in keeping with seasonal changes, a misalignment occurred between the institutional dominant projects and prosuming as a secondary project. As the seasons changed the Prosuming Project was delivering less and less to support the dominant Feeding-the-Meter Project. However, as we have seen in this chapter, the three practitioners who committed to prosuming saw, in effect, a strengthening of the relationship between not only Feeding-the-Meter but also the Maintaining-Family-Routines project and with that the creation of space in daily pathways for this secondary, voluntary project. Table 8 below summarises the paths chosen by the four practitioners who committed to the Prosuming Project.

3.3 A summary of individual pathways

Table 8 below summarises the individual pathways for prosumers during the committing stage:

Table 8 Committing: Transformative Prosumers – a summary of individual pathways

Irene	By steadily performing the Prosuming Project, Irene grew in confidence as a practitioner. As the winter set in she embraced this seasonal change by returning once more to her prepayment electricity meter. She started to regularly record what appliances she had used, as well as the weather and how much was left on the prepayment meter. Monitoring and 'doing' the Prosuming Project started to morph together and gave her the embodied knowledge to experiment further and become a transformative prosumer. As she became a more experienced practitioner so she looked to embrace new practices to her performances and in the process started to redefine what it could mean to be a prosumer that went well beyond saving money - as important as this was. For example, Irene increasingly turned to her washing line because she liked the idea of using the sun's energy directly, even if she could have dried her clothes for free in the tumble dryer using the solar power. However, she also adapted the practice of air drying to accommodate the expectations of her children. Due to eczema they disliked the texture of air dried clothes, so Irene now ended her line drying practice with a quick blast in the tumble dryer to soften the textures. Remarkably, by consistently but also creatively deepening her practice, Irene saved significance sums over the winter – sometimes £15 in a week. During the committing stage of the project, Irene finally acknowledged that she was the energy expert in the household because of the skills she had developed with the Prosuming Project.. She also found that the solar energy monitor from the social housing landlord, installed half way through winter, was interesting but mainly acted as reassurance that she was an accomplished prosuming practitioner. Irene was proud of her achievements
Frankie	For Frankie, the solar energy monitor made a significant difference. It transformed her experience and enabled her to move during the winter from being a seasonal periodic prosumer to a transformative prosumer. During the establishing phase, Frankie did not have the embodied knowledge that solar savings could be made over the winter. She stuck to the mantra that sunshine equals power so when there were very few sunny days she assumed that she could no longer perform the Prosuming Project. In her own words she was "heartbroken". But the arrival of the solar energy monitor instantly transformed this, when she discovered that solar power was being generated on some days over winter. It did not matter that this was nowhere near as frequently as during the summer, what was important is that she had this knowledge that she could choose to act upon. Thus, Frankie once again put energy and enthusiasm into her performances, even sharing her free solar power with friends by periodically doing their washing for them.
Barbara	Barbara simply kept on performing the Prosuming Project and in the process became committed to it. She kept up her daytime routines all year round, because it not only helped with the Feeding-the-Meter Project but also with the Maintaining-Family-Routines Project. Barbara liked the fact that now she made sure that her washing and a number of other domestic chores were undertaken during the day rather than in the evening. She also welcomed the solar energy monitor as it gave her additional knowledge about solar generation and consumption. Barbara was surprised how much energy could still be generated even if it was not sunny; she felt that this would further improve her performance on grey days. While Barbara did not push at the boundaries of the Prosuming Project like the other three committed practitioners, it was still a transformative process for her. In particular her daily path was transformed as she found space in it to accommodate the Prosuming Project. This enabled her to have the space to relax in the evenings thus meeting a personal need but also fulfilling the institutional projects of Feeding-the-Meter and Maintaining-Family-Routines.
Zoe	Zoe and her daughter Tracey continued their prosuming performances over the winter, although they did stop during the Christmas break. For most of the winter they saw some savings on their energy costs. In fact over a couple of weeks in November, Zoe noticed that she had stopped making savings which alerted her to the fact that her solar panels were not working. However, it was the breakdown of the tumble dryer that accelerated the transformative effect of the Prosuming Project. Instead of spending a few pounds fixing it, the family decided to replace it with a washing line and trips to the local launderette. Again, like Irene this was not just about saving money, although a key component, it was also about engaging with energy differently. Tracey liked the idea of using sunlight rather than always relying on an energy intensive appliance - even if it was being run at times with solar power. The solar energy monitor reinforced this commitment and added to their knowledge. Tracey and her brother Ben found it helpful as a reminder of how much energy they were using, as well as when they were generating it. Additionally, by committing to the Prosuming Project, laundering practices changed even further. For example, with no tumble dryer Tracey thought twice about whether an item of clothes really needed to be washed. Zoe also stopped picking up clothes off the floor of her children's bedroom - she only washed clothes in the basket.

4 BACK TO THE FUTURE

This chapter has highlighted how the knitting together of the secondary, voluntary Prosuming Project, with dominant, institutional projects, was a critical threshold in reducing the tensions between performing and defecting during the commitment phase. Dominant projects helped to create and maintain the space in the daily paths of prosuming practitioners, once the secondary, voluntary project had demonstrated it could consistently support their objectives of feeding the meter and maintaining family routines. However, this gives an impression that individuals are acting entirely on the behest of the institutional projects, as their carriers. Undoubtedly dominant, institution projects are highly influential in the daily paths of practitioners and, as they became embedded in them, they inevitably also influence life paths, not least because the accumulated knowledge that comes with being a project practitioner can direct future activity as Spurling highlights:

> The external/internal dialectic refers to the interplay between the 'external' corporeal actions experienced in the activities of the daily path and the 'internal' mental activities of the individual. A reflexive process in which knowledge and experience from previous projects is imprinted on current activities, and new knowledge and experience is acquired. This dialectic is conceptually useful as it takes account of the experiential learning that is accumulated by individuals across their biography, as well as acknowledging the agency individuals have in their daily lives (Spurling, 2010, p. 24).

The findings from the adopting, establishing and committing stages have all demonstrated that project-practitioners were far from passive carriers of projects as they actively mobilised elements and orchestrated practices and projects to their fulfilment. And yet for the Prosuming Project to secure a strong hold on the daily paths of busy households, it was not enough to successfully knit it together with dominant projects, as critical as this was. The secondary project also had to offer practitioners internal and external rewards as well as the chance to innovate (Shove et al., 2012). The result was four practitioners crossing the commitment thresholds and emerging as transformative prosumers.

But what of the Prosuming Project? Did it too undergo a transformation? While this study has developed a methodology to explore project-as-performance rather than project-as-entity, it still has insights to offer the latter although to fully understand this, further research would be required. However, Spurling and Blue (2014) argue that one way to approach entity is to embrace the variations of performances within it rather than assuming an ideal social practice type. This approach recognises that "past performances have implications for the present, and that performances now make certain things more or less probable in the future" (Spurling and Blue, 2014, p. 5). This research offers a case study on the evolution of prosuming within the context of a social housing estate with high multiple deprivation indices. Standing back and looking at the performances of prosuming over the entire length of the ten month study, the contours have shifted as adopting, establishing and committing

unfolded along with their different pathways. While transformative practitioners have been particularly active in shaping the Prosuming Project - not least because they continued performing across the ten months - all the practitioners have played a role to varying degrees. What emerged after only ten months was the potential for prosuming to turn its gaze from a focus on shifting energy but also to storing, saving and sharing it, as now discussed.

4.1 Shifting energy

Right from adoption, most practitioners worked out fairly quickly that in order to support the Feeding-the-Meter Project they had to shift their energy demand to simultaneously coincide with energy production. This was similar to some of the findings in the studies reviewed in Chapter 2. However, as also discussed in the literature review, this was not always straightforward. By the establishing phase, social-solar synchronisation encouraged load shifting, but this was also undermined with seasonal changes and other demands being made on busy daily pathways. However, by knitting together prosuming with the Feeding-the-Meter and Maintaining-Family-Routines projects, practitioners were able to the most of the solar power they were generating whatever the season. This was further accelerate during the winter and spring with the arrival of solar energy monitors. While there was some evidence that practitioners were opportunistic (Abi-Ghanem and Haggett, 2011) in their approach to shifting energy, this was rare because of how deeply energy frugality (Jenkins et al 2011)ran within the households. Even if they could operate their tumble dryer in the height of summer on free electricity, a number of the families felt uncomfortable about this as it seemed a wasteful use of resource.

4.2 Storing energy

As discussed in Chapter 7 during the adopting phase, a number of the households assumed the solar PV system came with battery storage. They were aware that most of their energy demand was at night thus it made sense that they could store electricity generated during the day to use when it was most needed by the family. While they worked out that was not the case by experimenting with the prepayment meter, they were still left with a sense of disappointment that their energy could not be stored. Some of the households did however undertake small steps towards realising this ambition, by using the batteries in their tablets or phones to charge during the day and then use them at night. However, this was also often not convenient because it was during the day that practitioners often needed their electronic devices. Without a doubt, battery storage was an aspiration for many of the households.

4.3 Saving energy

Saving on the cost of electricity ran across all three stages adoption, establishing and committing. It was the compelling reasons why the households adopted prosuming as Feeding-the-Meter was such a important project that any support of it was at least worth considering. What also emerged was how households could save money for their prepayment meter project but also enhance the Maintaining-Family-Routines Project by reducing the stress of trading one social practice off against another. Thus, Val no longer had to choose between cooking and washing on a Sunday. Additionally, for those practitioners who committed to prosuming, they were reassured by saving at least some electricity across the year. However, saving energy also took on new meanings as practitioners became skillful at the Prosuming Project. Some, for example, took the competence element and transferred it to other projects and practices - for example also saving on water or gas. This finding in part resonates with a study of electric vehicle car drivers in Norway:

> Our study indicated that the electric vehicle driving practice may have spillover effects to other social practices, such as energy consumption within the household in general. To give an example, many of the interviewees reported that the practice of driving an electric vehicle made them more environmentally aware and more conscious about their energy usage in general, as the scarcity of energy resources became more visible to them when driving an electric vehicle (Ryghaug and Toftaker, 2014, p. 157).

This issue of resource scarcity was also relevant in my prosuming study. It was linked to the emergence of the Japanese concept 'mottainai' as a meaning element in the evolving Prosuming Project. In essence, mottainai combines a respect for nature (Iwatsuki, 2010, p. 8) with a feeling that any resource is "too precious to waste" (Yergin, 2011)[15]. For example, mottainai was part of the vocabulary of elements for the two committed practitioners who started to opt for line drying on sunny days even though they could have run their tumble dryer on free solar power. This finding reflects a Japanese study of 200 solar PV households where nearly a third felt that their sense of mottainai had been strengthened since generating their own power (Hondo and Baba, 2010). The authors hypothesised that this was due to a combination of not wanting to waste a natural resource, but also because the households generated the power themselves:

> Although mottainai is a broad concept, it can be interpreted here as a sense of regret concerning wasteful use of objects or resources except for money… because households started to produce electricity on their own, they may have felt that electricity or energy should not be used wastefully…other characteristics of PV systems – direct use of natural energy sources– may have made households feel that the natural resources should not be used wastefully. After the installation of PV systems the two characteristics, i.e. the production of electricity at home and the direct use of natural resources, created or stimulated a sense of mottainai (Hondo and Baba, 2010, p. 234).

[15] See Wikipedia for a fuller description https://en.wikipedia.org/wiki/Mottainai

While this was in evidence in the commitment practitioners, to varying degrees, a number of the periodic prosumers had similar views. As Val said "It's quite cool to think that I've got solar panels on my roof …But I'm not an eco-warrior…I'm careful, I don't like wasting energy." This fits with Strengers argument that practitioners are more likely to engage with home generated energy as they had directly experienced its scarcity, unpredictability and diurnal and seasonal rhythms:

> We can infer that energy systems that are materially present, tangible or require some degree of handling, as well as those that draw on temporally limited, seasonal, intermittent, finite or scarce sources of energy, are better than those that do not. By 'better' I meant more likely to enroll householders in energy-making practices that position energy as tangible, temporal (or seasonal) and limited (or scare and valuable) material. Further, these energy-making practices are more likely to intersect with everyday practice in ways that potentially shift and shed energy demand. (Strengers, 2013, p. 151).

4.4 Sharing energy

But even as a new element, mottainai was not immune to transmutation as it started to merge with 'energy frugality' (Jenkins et al 2011 p) one of the meanings elements of the Feeding-the-Meter Project. Combined, they covered the importance of saving money on electricity costs alongside valuing solar power as a community resource as demonstrated by Tony:

> We're not draining the power. I believe that probably more is going back to the grid than we're using…The people that really need it [are here]… that's where all the excess should go..,.Or what goes back to the grid will reduce the bills for the area, so basically everyone's helping everybody... That way it's trickling back.

Frankie too felt strongly that the solar electricity should be kept within the community: "If I weren't in and it was going to waste then I could send [my electricity] to them...I'm sure they'd be grateful for it...Might make a new friend, you never know!" Frankie even started to experiment with these ideas by offering to do washing for her sister and a friend to take advantage of the solar power. The desire to retain solar power within the community reflects a similar finding from a Danish study amongst home owners:

> The prosumers had no control over who received the electricity they produced or if the energy they sent back into the system was used in a sensible way…The frustration created entrepreneurial ideas among some of the participants, which in this case were directed towards the local community and the collective (Hansen and Hauge, 2017, p. 12).

The desire to share was however not confined to energy, it also encompassed knowledge. A number of the households discussed their prosuming activities with family, friends and neighbours, sharing and learning how to improve their prosuming performance. In addition, all the practitioners, apart from Val who for personal reasons could not take part, contributed to sharing their solar experiences through the production of the booklet discussed in chapter 5. They could see the value of learning

through sharing know-how. Even though Val had not been able to take part in these discussions she still could see the value of sharing knowledge within the community: "If someone has actually got [a solar roof]...and living ... with it, then... people would listen to that... not being told by some big wig." Frankie too maintained the importance of such conversations:

> Obviously everybody's got different views on them... like someone could not have solar panels and think they're like the biggest pile of rubbish ever. But then, I could... say 'Well no, I saved this much...' And that could [help them] turn round and say, 'Oh, right, well...there's the proof, you've had the experience with them, oh maybe I will give them a go.' You know that could help somebody.

4.5 The Energy Shifting-Storing-Sharing-Saving Project

In only ten months practitioners had pushed at the boundaries of the Prosuming Project and showed not only their own ability for transformation but also the project itself. Amongst seven households on a social housing estate the meaning element of prosuming had changed from being just about "posh" people but also about being relevant for "poor". With this transformation, an increasing sense of solar entitlement grew, along with the competence element needed to become prosuming practitioners within this community. But as important as these elements were, without the material element of solar panels there are no prosuming practitioners. While meanings and competence can be mobilised from existing elements, this is not the case for the solar PV unless a household goes down the 'DIY' route for installing panels, which would be difficult for numerous reasons not least that social housing tenants do not own their homes. Despite prices falling in recent years ("Energy Savings Trust," 2017b; Ingrams, 2017), solar panels are still prohibitively expensive for many households let alone those living in an estate with high deprivation indices. And the cuts to the feed-in-tariff dramatically reduced the number of social housing landlords investing in the technology (Howard, 2015; Vaughan, 2016),.

And yet despite these real issues, the study offers hope. It highlights the resourcefulness of households who are adept at managing two important institutional projects - Feeding-the-Meter and Maintaining-Family-Routines. It demonstrated their considerable ability to transfer these skills to a different project and in the process change it and themselves. It also revealed a new potential project in the wings. The Energy Shifting-Storing-Saving-Sharing Project was a small collection of project-as-performances - a barely formed 'chrysalis'. But given the right conditions of circulating elements and mobilisation across social groups, then a project-as-entity 'butterfly' could emerge at some point. This project has the potential to support a Feeding-the-Meter Project both within individual households but also within a wider community. And that, as Shove et al argue, is in part determined by those who have the opportunity to become practitioners as they can help open or close potential future pathways for others:

> …whether framed from the point of view of practice or practitioner, inequities of access and participation are cumulative. In general terms, and again from both perspectives, past configurations are important for what might happen next. This is because the careers of practice-as-entities are defined by the performances of changing cohorts of carriers (Shove et al., 2012, p. 65).

5 CONCLUDING SUMMARY

The final stage of the conceptual framework saw the development of a vocabulary of elements by practitioners who committed to the Prosuming Project. Prosuming practitioners had to build up new knowledge and skills to turn the project from a seasonal activity to one that could be sustained all year round. They did not have the 'know-what' information that prosuming was potentially an all year round project, and instead had to further develop the know-how they had built up over the summer and autumn to help them through this period.

To help them do this, the committed practitioners also started to experiment again – monitoring, to varying degrees, their performances against their prepayment meters. This not only created closer links with institutional projects - key to maintaining a commitment over the winter - but also a range of other benefits. The financial benefits were particularly important to Feeding-the-Meter Project because of the extra strain it was under, due to increased energy demand and costs over the winter. In addition, the Maintaining Family Routines Project benefitted from the consistency of prosuming operating around the year.

This increased knitting together between prosuming and the institutional projects was a critical threshold to its survival over the winter and retaining the commitment of practitioners. But the project itself also had to offer more if it was going to retain practitioners. As commitment unfolded, so a range of rewards was offered to practitioners beyond the financial - although this was still central to their involvement. Other rewards included reduced stress, and other well-being indicators such as feelings of control over energy costs. An additional threshold for commitment was the chance for practitioners to innovate with the Prosuming Project - in other words to sustain their interest even when financial rewards were reduced over the winter. What happened, was that the committed prosumers embraced the chance to redefine the Prosuming Project from their first encounters through the addition, transmutation and circulation of elements, alongside the orchestration of practice and projects.

So prosuming was transformed from a project that was closely aligned with affluent people, to including those who could only afford to pay their electricity bills using a prepayment meter. It also moved from a project with an individual focus, to one that many practitioners felt should have a

collective outlook - sharing knowledge within their community - and an aspiration for sharing energy. This in turn imbued the project with the importance of frugality and 'mottainai' - a respect for resources. It was also transformed from a project focused on shifting energy to sunny days, to one that could be performed all year round. Committed practitioners, to varying degrees, pushed the boundaries of the Prosuming Project and it in turn further developed their commitments and skills. In a relatively short space of time - months not years - there emerged the potential for a new project focused on Energy Shifting-Storing-Saving & Sharing both within the household and within the wider community. And as discussed above, this matters not only for how prosuming might evolve in the future, but also whom it is accessible to.

PART 4

CONCLUSIONS

CHAPTER 10

EVOLUTION OF PROSUMING: A SOCAL HOUSING CONTEXT

1 INTRODUCTION

The **last chapter** concluded that, within the context of a social housing estate, the Prosuming Project evolved in just a few months to being more than just about load shifting - the simultaneous generation and consumption of solar power. It showed that while a small number of transformative prosumers were pushing at the boundaries of the Prosuming Project, periodic practitioners also had a hand in shaping its development. In the future, prosuming has the potential to transform into a new project – the Shifting-Storing-Saving & Sharing Energy Project.

This chapter brings together the findings of the last four empirical chapters to answer both the overarching research questions as well as the subsidiary ones.

In more detail:

Section 2 starts by examining the four subsidiary research questions by highlighting the key features of adopting, establishing and committing to the Prosuming Project, as well as the period before the installation of solar PV panels.

Section 3 draws on the four empirical chapters to present nine key themes that emerged from the findings. Together these themes address the overarching research question as to how and why prosuming evolved for social housing tenants.

Section 4 concludes the chapter

2 KEY FEATURES OF THE PROSUMING PROJECT

The overarching research question for the study is concerned with exploring how and why prosuming developed within the context of a social housing estate. To answer this I initially examined a number of solar PV studies to see if they could provide any insights into this question. Some had framed their research in terms of behaviours. In other words, given the right information and financial incentives, microgeneration could encourage individuals to shift their behaviours to ensure electricity consumption coincides with solar production, and even had the potential to reduce energy demand (Keirstead, 2005). But evidence of this "double dividend" (Keirstead, 2005, p. 4139) - renewable energy production and changing behaviours - was, at best, mixed within the literature. While some solar PV households may have changed their energy behaviours, there were many others - including those vulnerable to fuel poverty - who did not behave in ways to maximise their financial gain, and others who used more electricity not less as a result of becoming prosumers. Instead, a number of studies examined in Chapters 1 and 2, suggested that to understand prosuming we need to look beyond behaviours and understand producing and consuming solar power within the context of daily lives and look at how energy demand is deeply embedded in people's daily routines or 'social practices' such as laundering or cooking (e.g. Abi-Ghanem and Haggett, 2011; Ellsworth-Krebs and Reid, 2016; Hansen and Hauge, 2017; Olkkonen et al., 2012).

Thus in order to answer the overarching research question I turned to Social Practice Theory with additional ideas drawn from Time Geography. It enabled me to analyse prosuming as a project that involves people as 'practitioners', mobilising elements and orchestrating practise and projects to its fulfilment. Given this theoretical underpinning, in order to answer: "Why, and how, does prosuming evolve for social housing tenants?" I framed all four subsidiary questions in terms of the 'Prosuming Project' and devoted the four empirical chapters to answering them.

2.1 What are the key energy related practices and projects prior to the emergence of the Prosuming Project?

2.1.1 Energy demand was embedded in social practices and projects

The households were asked to reflect on how electricity was used, including, in their eyes, areas that were deemed particularly energy intensive or expensive. For short hand purposes we discussed these as electricity 'hot spots'. In other words, an activity or a place in the home that they felt used a lot of electricity. However, hot spots were difficult to ascertain because households did not conceptualise energy purely in demand terms but in relation to the services that it provides in terms of social practices and projects. However, given the interviewees intimate knowledge of their prepayment

electricity meters, many recognised that laundering was probably an energy hotspot as for many it was undertaken several times a week - in some cases several times a day. But, despite highlighting this social practice being a probable 'hotspot', it only included washing and not drying practices. This was surprising given that all but one of the households used the tumble dryer as a material element - one of the most expensive household appliances to run ("Household Energy Consumption," n.d.). However, it was also apparent that many of the households knew that tumble dryers were expensive to run, but that this was a price worth paying for the important role it played in their busy daily paths.

Many households did not also rate lighting or electrical appliances such as computers, as energy hotspots. While they were often linked to their children and their potential to waste energy, this was not generally considered contentious. Parents would of course prefer their children to be more mindful of their energy use, but the overwhelming feeling from most of them was, that children will be children: lights get left on. What also stood out in this pre-solar period was how far energy was also embedded within household projects through the orchestration of valued social practices by practitioners. In particular two were relevant for this study: Maintaining-Family-Routines Project and Feeding-the-Meter Project.

2.1.2 Maintaining-Family-Routines was a key dominant institutional project

The Maintaining-Family-Routines Project emanated from the family as an institution and addressed a whole range of demands. For example, ensuring that ensured children got to school on time, did their homework, turned up looking presentable and many other expecations that are made of families from another institution – education. However, the Maintaining-Family-Routines may have been a dominant, institutional project but it also met individual priorities. For the practitioners family routines were also synonymous with being a good parent – particularly for younger children. Their intuition is confirmed in academic literature that highlights how such routines can help children feel safe and secure. In order to achieve this project, practitioners needed to orchestrate practices such as cooking and bathing, as well as the almost continuous laundering routines, to fulfil the demand for clean school uniforms and family rules around cleanliness. Unlike the 'holding things together" assemblages of practices identified by Christensen and Røpke (2005), the Maintaining-Family-Routine Project was seen in a more positive light – in the words of two practitioners: "It works!" It helped give practitioners confidence in their parenting skills but also managing not only their own busy daily paths, but also those of family members.

2.1.3 Feeding-the-Meter Project was a key dominant institutional project

The Feeding-the-Meter Project was, however, not such a positive experience for practitioners, although equally as necessary. It too was a dominant project given the importance of maintaining an

electricity supply for meeting institutional demands of the family - such as having a shower before going to work or a cooked meal in the evening. Practitioners developed knowledge - in particular, embodied know-how - to help them manage their limited financial resources to try and ensure electricity was available for social practices. This involved having to make difficult decisions about trading off one valued social practice against another – cooking or washing clothes was one example. The project, which was imbued with concepts of frugality, worked closely with the Maintaining-Family-Routines Project to ensure that practitioners did not run out of electricity at key pressure points in the daily paths of family members.

However, while there was a synergy between the two projects, they were not always compatible. In particular, using the energy intensive tumble dryer put a strain on the Feeding-the-Meter Routines - it was not a frugal choice as a material element for drying practices. However, for the Maintaining-Family-Routines Project it was considered an important material element given its role in ensuring that clothes could be reliably dried whatever the weather. Given that practitioners were responsible for the fulfilment of both projects, they also made sure that their own personal interests were protected alongside those of the institutions. Thus, the tumble dryer survived and was accommodated within both Maintaining-Family-Routines and Feeding-the-Meter Projects.

2.1.4 Project memories were influential

The final key feature that stood out in the pre-prosuming days was the importance of practice memories (Strengers and Maller, 2012) - what I term here 'project memories'. For a number of households this was directly relevant to the Feeding-the-Meter Project as they had grown up with prepayment meters and seen their mothers mobilising elements and orchestrating practices and projects for it. In addition, current laundry practices were closely associated with practice memories around cleanliness conventions - what was acceptable or not in terms of clean clothes. However, other practice elements had changed. In particular, the tumble dryer was more prominent than in the past, so as powerful as practice memories can be to shaping projects, they can also be challenged when practitioners are faced with other pressures on their daily paths. Yet one practice memory that did not appear to be challenged was around maintaining routines. A number of the households had a positive experience of growing up with regular household routines and wanted their children to have the same.

2.2 What are the key features of the adopting stage of a Prosuming Project

2.2.1 Importance of first encounters

As Shove et al (2012) highlight, first encounters are important, as individuals often do not have direct experience of how others perform practices, particularly ones that are not part of their daily repertoire.. This was particularly important in this case - as only one out of the seven households had ever encountered someone in social housing with a solar PV system. Given the cost of panels that is not so surprising, but even with free access to them, the individuals were still not immediately in a position to adopt the Prosuming Project as they did not have the other elements needed to undertake a performance.

For most of them, prosuming was associated with "poshness", designer homes and owner occupation, not tenants living with prepayment meters on a low-income estate. The meaning element was imbued with a strong sense of lack of solar entitlement and this in turn undermined the material element. Many of the households simply did not believe the offer of free PV panels and ignored the letter from the solar installer and social housing landlord. However, even once convinced it was genuine; their first encounters of the competence element also undermined their efforts to perform the Prosuming Project. For some, the top down 'know-what' information they were given, resulted in confusion. A number of them were even left wrongly assuming that prosuming should be performed at night.

2.2.2 The mobilisation of elements - additions, transmutations & circulation

Even with the material element in place, the households were still initially unable to mobilise meanings and competence in order to adopt the Prosuming Project. Given the disadvantaged community in which the families were living, additional elements were needed alongside the transmutation and circulation of elements. In other words, they required a different set of elements that, unlike their first encounters, were compatible with their lived experiences.

To start this process, the practitioners turned to a well-known piece of technology in their homes - the prepayment electricity meter. They used it to help them experiment with, and monitor, the Prosuming Project - adapting social practices and seeing what difference this made to electricity use and importantly credit on the meter. This process was inextricably bound up with the transmutation of the competence elements. All of the households, to varying degrees, developed embodied knowledge by seeing how their newly adapted practices, along with the weather, made a difference to the prepayment meter. This in turn also impacted on the meaning element. As the households saw the financial savings that the Prosuming Project was making to their lives, they shared their stories with

friends, family and neighbours. This also coincided with the appearance of solar PV panels in the community. Hence, the new meanings and competence elements started to circulate through the shifting physical and social fabric of the estate.

In a very short space of time, the sense of solar entitlement started to change, as the Prosuming Project was no longer solely associated with affluence, it could also be performed on a social housing estate. Even at this early stage, project-practitioners started to show signs of innovation by adapting the prepayment meter to a different use than what was originally intended - in effect it became a solar energy monitor. This was combined with a period of experimentation as practitioners explored just what the project could mean for them and how it could be aligned with dominant, institutional projects.

2.2.3 Beginning to align Prosuming Project with dominant projects

Prosuming did not emanate from work or family institutions and was regarded by the practitioners as a secondary project. For example, their social landlords did not insist they have the solar panels fitted on their roofs, let alone be a prosumer and actively use the power generated at source. It was entirely voluntary and as a result the Prosuming Project had to fight for space in the busy daily paths of individual practitioners. The Prosuming Project did this by starting to align itself with two dominant projects.

All seven householders, to varying degrees, needed to transform the competence element from largely 'know-what' facts given to them by the solar installer, to an embodied 'know-how' that emerged from their daily paths (Royston, 2014). They achieved this, in part, by turning to the prepayment meter as a material element but also the competence element from 'Feeding-the-Meter'. While Feeding-the-Meter was not seen as a pleasant project, the individuals were skilled practitioners and well versed in aligning domestic routines to their prepayment meter. These valuable skills and knowledge were adapted to the new context of solar power generation. The Maintaining-Family-Routines Project also played a role in adoption, although to a much lesser degree compared with Feeding-the-Meter, by helping households manage their new daytime routines around work and family commitments.

However, dominant institutions, can also flex their muscles. While this was not overtly apparent in this early adoption phase, there were hints. For example, one householder became disillusioned with the project after not saving any money on his prepayment meter. It took an extra face-to-face meeting with the solar installer for him to realise that his shift work did not fit well with the needs of the Prosuming Project to carry out domestic routines during the day. Once he knew this, he was happy to adopt the Prosuming Project, but also reduced his expectations.

2.2.4 Orchestration of elements, practices *and* projects

The conceptual theoretical framework developed in Chapter 3 discussed the role of practitioners mobilising elements as well as orchestrating practices to a project. This was in evidence during the adoption phase, but also what emerged from the empirical findings was the significance of other projects to this performance. By starting to align a secondary project with institutional dominant projects, it was easier for practitioners to find space in their daily paths. This was similar to the process that was seen in the prologue, whereby practitioners merged institutional demands with their own individual interests and concerns. Once the practitioners had established that the Prosuming Project could support the Feeding-the-Meter Project, they tried to find space in their daily paths for it.

2.2.5 Tentative prosumers

The meaning of tentative includes being experimental, and all seven households approached the adoption phase in this spirit. Thus, they carried out tests as well as keeping an eye on the prepayment meter to see how adapting practices to the Prosuming Project made a difference to their electricity costs. This experimental approach helped them gain the knowledge they needed to improve their performances and support the Feeding-the-Meter Project.

But tentative also has another meaning as cautious, and this too was seen in all the households, bar one, during the adopting phase. The families wanted to see if the prosuming was worth investing time in before they committed to it. However, this was not just about the logistics of fitting another project into an already packed daily path - as important as this was - it was also about whether to emotionally invest in prosuming. All the households were aware that it could make a significant difference to their Feeding-the-Meter Project and did not want to adopt prosuming and then find themselves disappointed. As the householders began to develop confidence in the Prosuming Project, they started to perform it more regularly and segued into the establishing phase by becoming periodic prosumers. The one householder that did not take a cautious approach already knew that prosuming could make a difference as she had a friend who lived in social housing with solar panels. She swiftly moved from being a tentative to a periodic prosumer, while another tenant took several weeks because of family and work projects that made it initially difficult to find the space in his daily path

2.3 What are the key features of the establishing stage of a Prosuming Project

2.3.1 Embedding of the elements

Adoption of the Prosuming Project segued into establishing with all seven of the original practitioners becoming periodic prosumers. From an elements point of view, this appeared initially as a stable time,

but under the surface practitioners were still needing to mobilise some additional elements as the project, and themselves as practitioners, evolved. What was noticeable during this phase was the circulation of elements from the dominant institutional project, Maintaining-Family-Routines and Feeding-the-Meter, and the Prosuming Project.

2.3.2 Social-solar synchronisation

The collaboration between the Prosuming Project and the dominant projects resulted in social-solar synchronisation (Walker, 2014). This process embraced the know-how that practitioners had developed in Feeding-the-Meter and Maintaining-Family-Routines and adapted it to the Prosuming Project, alongside the new knowledge that was being created by performing it. What emerged was that social practices that could most easily be adapted to the Prosuming Project had a degree of flexibility in terms of their timings, as well as largely involving just one person or one daily path. Thus laundering, washing, drying and ironing, were all practices that offered this, assuming a practitioner had, across a week, some time at home during the day. However, cooking as a social practice rarely met this flexibility criteria, because of how closely associated it was with eating practices, and the complex coordination of the daily paths of different family members. Invariably cooking was tied to late afternoon or early evenings for many of the households in the study. For many, cooking practices were also a central weekday pivot in the Maintaining-Family-Routines Project, around which a number of other sequences of practices were performed with children - for example, playing, eating, homework, bath and bedtime.

However, in one household, cooking could be accommodated into prosuming because of the life stage of the family. The mother undertook 'bake days'- synchronising her cooking practices with solar generation by cooking bulk meals in advance to be frozen and microwaved later. As her children were much older, they rarely had meals together, but by baking in advance she offered her family mealtimes that fitted their individual routines.

2.3.3 Seeing the financial benefits

Practitioners had started to notice the financial benefits of the Prosuming Project fairly early on - for a number of them they had reduced their electricity costs by at least 50 percent over the summer. This saving was significant ranging from £20 to £50 per month. It was extremely helpful for the Feeding-the-Meter Project and, over the summer period, reduced the difficult trade off of valued social practice - such as cooking versus washing - for a number of the families. For others, it gave them a feeling of some more control over their energy costs.

2.3.4 Disruptions & institutions

The social-solar synchronisation was instrumental in helping practitioners to embed prosuming into their daily paths. However, when autumn changed to winter a number of the practitioners were left uncertain about how to adapt to the new circumstances. The resulting shorter days and reduction in sunshine broke the strong relationship that many of them the households had in using the sun as a visual cue for performing prosuming. It also undermined the relationship with the dominant project. For example, a number of practitioners developed a more ad hoc approach to the Prosuming Project particularly at the start of winter. Thus sometimes they would undertake washing during the day, as in the summer, other times they would do it night because they were not convinced any solar power was being generated. This was not helpful to the Maintaining-Family-Routines Project which, as the name suggests, requires consistency. As the sunshine cue for performing the Prosuming Project was disappearing, a number of households increasingly reverted back to their old routines.

This was, to some extent, surprising as many of the households had come to realise that they did not necessarily need a bright, sunny day to produce solar power. Additionally, all the practitioners had accommodated the change from summer to autumn and were fairly sanguine about the reduction in savings for the Feeding-the-Meter Project. They knew they would start up again in the spring when sunshine is more reliable. The feeling appeared to be that at least they were continuing to see some savings and assumed this would continue, to varying degrees, over the winter. However, as the daylight hours started to shorten and the weather deteriorated, so prosuming proved even harder and a number of the practitioners struggled with the project. Correspondingly, the money saved on electricity costs started to fall significantly for most of the practitioners, and in some cases stopped. This too challenged the support that the Feeding-the-Meter was giving the Prosuming Project.

2.3.5 Periodic prosumers

The term periodic has two meanings: one stresses the regularity of an event, the other irregularity - an occurrence that happens from time to time. Both capture the establishing phase of the Prosuming Project. Thus, a household may have started to embed prosuming into its daily paths, but could equally stop for a period because of family or work demands, or a change in the weather. If it was cloudy or rainy, practitioners may suspend prosuming for a day or two, but equally if it was sunny practitioners may have better things to do than their washing. But what really started to define the periodic prosumers was the change to the seasons. Once winter set in, a number of households stopped performing the project turning them into seasonal prosumers. In effect, they hibernated from the project over the winter, only performing the project once the weather improved and sunlight once again offered them a cue that the household was generating solar power.

Like the adopting phase, the establishing phase also faced tension from the possibility of practitioners walking away from the project – 'defecting' (Shove et al., 2012). In the end, only one practitioner did this, although another three households took up the option of becoming seasonal prosumers. The remaining three took a different approach: they kept on embedding the prosuming into their daily paths - even over winter - and segued from establishing to committing to the project.

2.4 What are the key features of the committing stage of a Prosuming Project for social housing tenants?

2.4.1 A new vocabulary of elements

While the establishing phase was marked by relative stability in terms of the elements for the Prosuming Project, this was not the case for the committing phase. Crucial to whether practitioners committed to the project, was their ability to maintain prosuming throughout the different seasons. For this they needed a new "vocabulary of elements" (Hui and Spurling 2013, p. 4). This included a meaning element that incorporated prosuming as an all year project, and the competence to be able to perform it across the seasons.

All the households had originally developed their know-how in relation to the summer - invariably sunny days. Additionally, solar installers had talked about how sunny days equalled solar power. The reduction in energy savings in the autumn appears to correlate with the reduction in sunny weather. So, with a significant reduction in sunny days over the winter the practitioners had to adapt the competence element to cope with a change in weather. Again, they turned to their prepayment meters to help them build the knowledge they needed, but half way through the winter a new material element made a significant difference to their performances - a solar energy monitor.

2.4.2 Monitoring and 'doing' - morphing together

Shove et al (2012) highlighted how monitoring and performing a practice can start to morph together - where it is difficult to see where one starts and the other ends. All three of the practitioners who committed to prosuming started to again use their prepayment meters to help them monitor their performances. However, one practitioner took it to a much higher level by rigorously recording her prosuming routines, the weather and how much credit was left on the prepayment meter over a number of weeks. This resulted in her saving around £50 a month during the winter - a significant sum for most people but particularly for a household living on state benefits.

While the prepayment meter was useful for reassuring practitioners that they were still saving some money over winter, it was ultimately reactive: offering insights into electricity costs after the social practice had been completed. The solar energy monitor, however, gave real time knowledge. Unlike the prepayment meters, the solar energy monitors were designed specifically to alert practitioners to electricity being produced and whether it was also being consumed by the household, or not.

The meter emitted different coloured lights depending on the status of energy production and consumption. For example, when a household was producing more energy than they were consuming, the monitor glowed green. This material element was used in different ways by the practitioners. The woman who had used her prepayment meter to record her performances, found the monitor reassuring rather than offering her new know-how. However, the other two women who committed to prosuming, found the meter improving their performances particularly on grey, winter days when previously they had been unsure whether they were producing solar power or not. For a final fourth practitioner, the monitor enabled her to move from the establishing to the committing stage. She had been an enthusiastic prosumer from the start, swiftly moving from adoption to establishing, as she knew the benefits of the project because a friend had solar panels. However, during establishing she remained as a periodic prosumer largely because of giving up the project over the winter. She simply did not believe that solar power could be generated without sunshine and thus did not keep to her daytime laundering routines. Thus the solar energy monitor made an immediate difference. She was amazed to see on a February day that she was generating power and from then onwards committed to the Prosuming Project. The solar energy monitor replaced the sun as a visual cue that had become, for her, unreliable over the winter.

2.4.3 Thresholds to transformation

Like social practices, the Prosuming Project experienced tensions between adoption and defection and establishing and defecting. However, as Shove et al argue, this is not inevitable and by committing to a practice the threat of defection gives way to transformation (2012). What emerged from the findings were three thresholds that defined the commitment stage and contributed to the tensions between performing and defecting.

The **first threshold**, was critical in enabling practitioners to embed the Prosuming Project into their daily and life paths and with that, reduce the tensions between performing and defecting. This was about the knitting together of prosuming with the two dominant, institutional projects - the Feeding-the-Meter and the Maintaining-Family-Routines. While the two dominant projects worked closely with prosuming during the establishing phase, the periodic nature of the performance undermined the relationship. However, the committed prosumer offered consistency, which helped prosuming knit

together with both the dominant, institutional projects. The Maintaining-Family-Routines Project benefitted from the Prosuming Project keeping to regular performances across the year, rather than stopping and starting. It also meant that at least some financial savings were being made across the year - albeit smaller in winter – again contributing to more consistent support for the Feeding-the-Meter Project.

The **second** threshold was not so critical to practitioners committing to the Prosuming Project, but it was still important in encouraging them to find space in their busy daily pathways for it. This threshold reflects Shove et al's (2012) assertion that internal rewards are important for retaining practitioners. During the committing stage, practitioners took pride in the expertise they had developed, while some found intrinsic enjoyment in going outside to put their washing on the line rather than staying indoors and turning on the tumble dryer. However, external financial rewards were also important and this had been in evidence since the adopting phase for all the practitioners. But to define external rewards simply in monetary terms is too narrow. The saving of electricity costs enabled a number of families to reduce difficult 'heat or eat' type decisions, but also contributed to their emotional well-being. For example, by reducing the need to have to choose between valued social practices, the practitioners reduced their stress levels and increased their feelings of control over the cost of energy in the home. This was more in evidence in the practitioners who committed to the Prosuming Project, but was also seen in a couple of the practitioners who chose to remain as periodic prosumers.

The **final threshold** was the innovation potential for the Prosuming Project - again not critical, but important in encouraging practitioners to remain interested in a secondary, voluntary project (Shove et al., 2012). Taking Pantzar's and Shove's definition of social practice innovation to include a "new combination of materials, images and skills" (2010, p. 458) there was a wealth of opportunities for innovation in the Prosuming Project. Right from the adopting phase, practitioners had to adapt the set of elements that accompanied their first encounters to produce a very different Prosuming Project that could be performed in the context of a disadvantaged community. This included the transmutation of elements from the Feeding-the-Meter Project to the Prosuming Project. For example, the prepayment meter was adapted to serve as monitor to build know-how around prosuming. But while innovation was apparent throughout the evolution of prosuming, it was in the committing stage that practitioners really pushed at the boundaries of the project and started to redefine it by mobilising a new vocabulary of elements. What was also in evidence was that such processes were not isolated (Warde, 2005). As new contours of the Prosuming Project were shaped, so new elements started to circulate into other areas of domestic life for example, challenging the use of the tumble dryer as a material element for the Maintaining-Family-Routines Project or cleanliness conventions in laundering practices.

2.4.4 Transformative

All four committed practitioners underwent different degrees of transformation. This included an increased sense of well being as the Prosuming Project became embedded in their daily paths, as well as closely knitted to the important Feeding-the-Meter and Maintaining-Family Routines projects. But alongside this, there was also a transformation of prosuming as a project-as-performance that was not just influenced by the committed practitioners. As Shove et al write "the contours of any one practice - where it is reproduced, how consistently, for how long, and on what scale - depend on changing populations of more or less faithful carriers or practitioners" (2012, p. 63).

In just a matter of months, prosuming underwent a transformation as a result of all seven households adopting it as a secondary, voluntary project. It was no longer just associated with synchronising solar consumption with generation - load shifting. It could also encompass the saving of energy, and importantly, not just from the grid but also from the solar panels themselves. What is more a new element was born mixing the Japanese concept of 'mottaini' with frugality. This was about valuing a natural resource whether 'free' or not. But it also encompassed a wider meaning about not wanting to waste excess solar power given so many people within the community vulnerable to fuel poverty. Letting solar power escape to be used by the wider grid was seen as wasteful.

This new combined element of mottaini and frugality, is at the heart of a potential new project. The Energy Shifting-Storing-Saving-Sharing Project emerged from a collection of project-as-performances over just ten months. As such it is barely formed - a mere outline - but given the right conditions where elements can be mobilised and circulated across social groups, a project-as-entity could emerge at some point. Importantly, such a project has the potential to support a Feeding-the-Meter Project not just at a household level but at a community scale.

3 NINE KEY THEMES AS TO HOW & WHY PROSUMING EVOLVES

The last section examined the detailed findings to the subsidiary questions which together also embrace the overarching research question. Here I pull back the lens to present an overview of the nine key themes that emerged from the research and how these help to further understand how and why prosuming evolved amongst social housing tenants.

1 Adaption, improvisation & experimentation

From adopting to committing, the empirical evidence demonstrated the importance of practitioners adapting, improvising and experimenting (Warde, 2005) across the three stages of the Prosuming Project. Warde may have been referring to social practices, but his work is also applicable to projects. Prosuming as a project-as-performance, changed from being associated with shifting energy, to one that took on board saving energy and, if possible in the future, storing and sharing it within a community. It has the potential to emerge as a new project that encompasses - Energy Shifting-Storing-Saving & Sharing - if a wide diversity of practitioners are able to mobilise the elements needed.

However, the journey so far involved prosumers mobilising elements through additions, transmutation and circulation. For example, by adapting the prepayment meter to be also used in the Prosuming Project. Additionally, practitioners also adapted dominant projects and their practices to enable them to fit prosuming into their daily paths, and vice versa. Hence, one household changed from using a tumble dryer as their material element for the Maintaining-Family-Routines Project, to line drying and the laundrette. This adapted practice had different rhythms to the old one, as drying now had to be fitted round sunny, windy days or when someone had time to go to the laundrette. By changing the material element, cleanliness conventions also started to change. For example, one teenager started to question whether she needed to wash jumpers after only wearing them once because it took more effort to hang washing on the line.

2 Evolution of solar entitlement

At the outset of the study a number of the households associated producing and consuming solar power with, in their words, "posh" homeowners rather than "poor" social housing tenants. A number of the households talked about how solar panels were represented in the media in terms of making money from feed-in-tariffs or being associated with affluent eco-designed homes. There was an overwhelming sense of lack of solar entitlement for many of the households - prosuming did not belong to an estate facing multiple deprivation issues. Although for the one household who knew someone in social housing with solar panels, the meaning was quite different - she assumed that one day she would also get them. For many of the others, it took a meeting with the solar company to be convinced that the offer was genuine and, just as importantly, that solar panels could save money on their prepayment electricity meters. Even then, it was only once the panels started to appear on roofs, alongside emerging solar stories within the community, that the meaning of prosuming underwent a transmutation as the element circulated through the social and physical fabric of the estate. However, once the elements started to appear and circulate the change was fairly rapid: not years, not months,

but weeks. With this came an increasing sense of solar entitlement as the Prosuming Project started to become associated with their community, even though it was still a small fraction of households who had the panels.

However, with this sense of solar entitlement so too came questions. Firstly, many of the prosuming practitioners could not understand why more people were not benefiting from the solar panels, particularly those on low incomes living on the estate. It was not clear to them why they and not their neighbours had been chosen for the scheme. For some this felt unfair and uncomfortable. Secondly, most of the households were aware that they were probably only using a fraction of the solar power they were generating because of their frugality. The rest of the energy was going back to the grid. This again seemed unfair as the power was being generated on their roofs and yet they were still having to pay for electricity in the evenings and over the winter. A number felt that if they could not use the electricity, it should at least stay within the community. Thirdly, a number questioned why the Government Feed-in-Tariff scheme for encouraging microgeneration was a much better fit for owner-occupiers than social housing tenants on prepayment meters. Many realised that home owners not only benefited from the solar electricity they were generating, but also got paid a feed-in-tariff irrespective of how much they used of the free renewable power. Finally, again a number were frustrated to discover that they could only access their solar power when their prepayment meter was in credit. They assumed that the solar power would in effect work 'off grid' so they could still access the solar power for free whether they had credit on their meters or not. Given the importance of the Feeding-the-Meter Project within many of the households, this was disappointing to discover.

3 The flexibility of dominant projects

The story of how prosuming evolved could not be told without understanding the importance of two dominant institutional projects - Feeding-the-Meter and Maintaining-Family-Routines - and how they adapted to the Prosuming Project.

Firstly, these dominant projects offered elements that could be applied to prosuming - in particular competence. For example, the combination of Maintaining-Family-Routines and Feeding-the-Meter supported prosuming by offering know-how around how much credit on the prepayment meter certain domestic routines would use.

Secondly, the dominant projects were instrumental in helping to make space within busy daily paths, when it became clear that the Prosuming Project could help fulfil their own objectives. For example,

the Feeding-the-Meter project benefited from the reduction in having to trade one valued social practice against another, particularly over the summer.

Thirdly, an understanding of dominant and secondary projects offers a more nuanced understanding of prosuming. On the surface it might seem odd that families who are having to make 'heat or eat' type decisions, would not go out of their way to use every kilowatt of solar power they produced. And yet this ignores the institutional pressures of family and work on practitioners. None of them wanted to waste the solar power they were generating, but equally its use had to fit within their family and work routines, even at the committing stage.

Finally, once there was an acceptance that prosuming was an all year round activity, the voluntary project developed its own rhythms that adjusted to the seasonal changes as well as offering a consistency that was welcomed by the Maintaining Family Routines and the Feeding-the-Meter projects. This finding extends Pred's discussion of how a complex project is likely to have both "sub-projects" and potentially "off-shoot projects with activity-bundle sequences of their own" (1981a, p. 237). While this was in evidence, what was more striking was how projects became interwoven with each other. While there was still a hierarchy with dominant, institutional projects commanding time and space in busy daily and life paths (Pred, 1981b), prosuming as a voluntary, secondary project also had a voice. The more it knitted together with the Maintaining-Family-Routines and Feeding-the-Meter projects, the more its voice was heard. And this, in turn, led to space being created in busy daily paths as the secondary project fulfilled not only its own objectives but also supported those emanating from institutions.

4 Facing tensions and thresholds

As Shove et al (2012) write, recruitment and defection are often in tension although this dynamic can shift once a practitioner commits to a social practice. Although my study focused on the evolution of a project rather than a practice, similar tensions were in evidence during the adoption and establishing phases. For example, during adoption, many of the practitioners nearly rejected the Prosuming Project because they did not believe the initial solar PV offer letter from the solar installer. During the establishing phase there were also a number of times that households looked like they might defect - particularly when autumn changed to winter. However, in the end only one practitioner defected, with three others becoming seasonal periodic prosumers.

Shove et al (2012) write about how for some practitioners, commitment can build over time and, as it does, tensions reduce as thresholds are crossed. In terms of this research, three commitment thresholds emerged. The first was critical - the knitting together of prosuming with the dominant,

institutional project: Feeding-the-Meter and Maintaining-Family-Routines. The second was finding both external and internal rewards from the project. Again, practitioners found external rewards in the form of financial savings across all three stages, but it was during commitment that internal rewards also became apparent. The final threshold, innovation, was also apparent throughout all three stages, but by the committing stage, most of the practitioners were challenging the boundaries of the Prosuming Project.

5 Going beyond know-what

Know-what is often seen as imparting factual, instructional information (Royston, 2014; Royston et al., 2014). This was largely the approach from the solar installers who provide the tenants with a leaflet on how to get the best of the solar panels, as well as in a brief meeting on two occasions. While a few of the households found this approach helpful - particularly when it was conducted in a conversational "use it or lose it" style - for many, it did not give them the knowledge they needed to adopt the project, let alone perform it. For example, in a number of cases the households were left assuming that after the visit from the solar company, they should use their appliances at night in order to benefit from free solar power. Like the throwing away of the solar PV offer letter, this was yet another point at which the household could well have rejected the Prosuming Project having discovered that using appliances at night did not save them any money on their electricity costs. Instead, as we have seen, households turned to the experience they had built up as practitioners of the Feeding-the-Meter Project, as well as conducting experiments with their prepayment meters, to develop the knowledge they needed to become prosuming practitioners. This know-how or "practical knowledge" was developed during their performances and was instrumental in practitioners establishing the Prosuming Project over the summer (Royston et al., 2014, p 7).

Yet this know-how was less helpful as the seasons changed as the practitioner had not built up the knowledge needed for a changing environment with reducing daylight and sunshine. Their embodied knowledge largely reflected the know-what from the solar installer - sun equals power. Even the accompanying letter stressed operating appliances "when it is sunny", so it was not surprising that when the sun stopped shining, one practitioner defected and three others took a break from the project over the winter. They neither had the embodied know-how or the know-what that the Prosuming Project could be performed over the winter - albeit with reduced financial savings.

But there is another story to tell. Three prosumers took their know-how and built on it by once again keeping a close eye on the prepayment meter. They had seen the significant difference prosuming had made to their Feeding-the-Meter Project and they did not want it to stop. The solar energy monitor that was installed half way through the winter helped these performances by giving real time

information on energy production and consumption. In fact one periodic prosumer crossed to the committing stage once the solar energy monitor gave her knowledge that power could be be generated across the seasons, even if in smaller amounts.

6 One size does not fit all

One of the reasons for focusing in on project-as-performance was to reveal not only variation in performances but also practitioners. Although this study started out by recruiting a fairly homogenous sample - for example, parents living in social housing - what emerged were the differences. There was no one archetypal prosuming practitioner. Instead, the conceptual framework encouraged analysing prosuming and its practitioners in terms of a dynamic evolutionary process with different routes being taken at different stages. What did emerge however, were three broad groupings of prosuming practitioners.

All seven households could initially be described as **'tentative'** prosumers as they experimented with the Prosuming Project, to varying degrees, while mobilising the elements needed for adoption. Most of them also fitted the second definition of tentative as 'cautious'. Before adopting the prosuming they wanted to be reassured that it was worth investing time and emotional energy into. However, the woman who had first hand experience of prosuming through a friend also living in social housing, embraced the Prosuming Project from the start.

The '**periodic'** prosumers reflected the second stage of establishing the project - looking to embed it in daily paths although coming up against dominant projects that both aided and undermined this process. What was interesting here was the development of the seasonal periodic practitioners who were tempted to defect but stayed on because they knew that their performances could start up again once there were more sunny days in the spring.

The final group '**transformative**' prosumers coincided with the commitment stage. The practitioners who committed also experienced transformation to varying degrees. For example, one practitioner found her evenings transformed, as she no longer carried out laundering. For another, it meant not washing her clothes so often as she wanted to minimise her trips to the laundrette after a family decision to remove the tumble dryer. A third developed a strong sense of accomplishment in saving so much money for her family across the year. For the first time she had become the energy expert in the house.

7 Being opportunistic

As discussed in Chapter 2, the solar PV literature refers to the potential for a "double dividend" – that is a combination of solar power generation and behavioural change such as load-shifting and even reducing demand (Keirstead, 2005, p. 1249). However, the empirical findings from my research highlight that this concept is far from straightforward.

Similar to Keirstead's study (2005), all seven households shifted their energy demand, when work and family life permitted, with laundering practices being the most reliable and flexible to deliver both the Prosuming Project and the Maintaining-Family-Routines Project. However, energy reduction was more complex given that households on low incomes are much more likely to be low energy consumers compared with more affluent households (Druckman and Jackson, 2008). Even before the households became prosuming practitioners, the Feeding-the-Meter Project encouraged frugality across all seven households. Thus unlike the affluent households in Keirstead's study (2005), there was less room to become even more energy conscious, although the transformative prosumers highlighted the potential for this when they committed to the project.

The literature review in Chapter 2 also highlighted another layer to understand the complexity of the double dividend. Running counter to energy conservation was also energy opportunism - increasing energy demand in response to solar power generation. For example, one study of an eco-housing community highlighted how a number of households went out of their way to use as much solar power as possible - including buying new gadgets - behaviours that were seen as negative by the researchers (Baborska-Narozny et al., 2016). My study did not reflect such opportunism. No one reported purchasing a gadget to use the free electricity, or went out of their way to use the solar power for the sake of it. Additionally, Abi-Ghanem and Haggett saw evidence from their study that "opportunistic" solar PV home owners used the free power to prioritise "convenience and comfort" (2011, p. 156). This was partially reflected in my study as a couple of practitioners said they were considering using their tumble dryers more often in the summer because it made their lives easier. However, there was little evidence that this routinely took place.

However, what was reflected in my study was Vannini and Taggart's understanding of opportunists who "chose to become involved in certain activities at select moments in time in accordance with the rhythms of the sky" (2014, p. 151). Thus one of the practitioners in my study allowed her children to use their X-box when it was sunny, another washed her net curtains, a third carried out bake days. Vannini and Taggart's defined an opportunist as "a skilled, knowledgeable, and clever person who seizes the right moment to achieve one's goals" and this too resonated with my study (2014, p. 151). The prosuming-practitioners used the Feeding-the-Meter Project to keep the power on in their homes

and then drew on the Prosuming Project to reduce the frequency of trading off one social practice against another.

8 Improving well-being

Well-being is an increasingly popular policy term although difficult to pin down. The New Economics Foundation (NEF) has tried to do this by defining it as both "feeling good and functioning well":

> Feelings of happiness, contentment, enjoyment, curiosity and engagement are characteristic of someone who has a positive experience of their life. Equally important for well-being is our functioning in the world. Experiencing positive relationships, having some control over one's life and having a sense of purpose are all important attributes of well-being (Aked et al., n.d., pp. 1–2).

Exploration of well-being as a concept is beyond the scope of the thesis, however following the NEF's definition there were indicators that the well-being of a number of practitioners improved over the time of the study. This was most clearly seen in the financial improvement of a number of households. Saving money was not just a threshold that practitioners passed through on the way to becoming a transformative practitioner, it was a feature of the adopting and establishing phases too.

A study of home-owners in Durham (Bulkeley et al., 2014) highlighted how important it was for many of them to get a good return on their solar PV investment, although this was primarily through the feed-in-tariff rather than savings made to their electricity bills by using their generated power. However, the financial interest of prosumers in this study had a very different focus. For most, it was seen through the eyes of the Feeding-the-Meter Project. This was not a balance sheet of costs versus income, but primarily about reducing stress: being able to afford school shoes; no longer running out of cash the weekend before benefits are paid; not always worrying about having enough money to credit the prepayment meter. By the Prosuming Project supporting the Feeding-the-Meter Project ,the well-being of many of the families improved. A number of them directly addressed the NEF's understanding of well-being by talking about the sense of control the Prosuming Project had given them over energy costs. It was also an important reason why six out of seven practitioners remained prosumers - with four of them committing to the Prosuming Project and the others returning in the spring.

And yet, as important as the finances were, it was not the complete story as Chapter 9 highlighted. Practitioners who committed to the Prosuming Project also experienced "internal rewards" (Shove et al., 2012). These included the enjoyment of going outside to hang the washing on the line, rather than turning on the tumble dryer. It included a sense of pride in the prosuming skills they had developed that had made a significant difference to their family life. Or the teenage practitioner who challenged her family to start using a washing line - she rigged up not one, but three across the garden. A couple of the families found their relationship with their children changed in subtle ways. For example, it was more relaxing for the mother who no longer had to closely monitor her children in terms of their electricity usage - at least over the summer months. Or another, who stopped washing clothes, often clean ones, that had been left on the floor of teenage bedrooms. Now children had to put dirty clothes in the washing basket to be cleaned. Additionally, there was a general air of confidence around the transformative practitioner - they had proved themselves as experts not only to themselves but also to their families. Many of the qualities witnessed during this time - curiosity, engagement, enjoyment in performing the project - are all indicators of well-being as defined by the New Economics Foundation (Aked et al., n.d.).

The internal rewards reflect a discussion within the microgeneration literature of "use values"- that, in part, is concerned with the process of renewable energy production not just the final result (Ellsworth-Krebs and Reid, 2016, p. 1992). Some studies reported on the "sheer excitement and pleasure of DIY energy generation" (Dobbyn and Thomas, 2005, p. 7), while other wrote about the satisfaction in "tending to your solar garden". Based on an American study, Paulos and Paulo argued that the more effort that people put into extracting energy - both their own human power such as for a wind-up radio or from engaging with renewables - the more their chances of "improved quality of lived experience, in terms of pleasure, enjoyment, meaning, satisfaction, and so on" (Strengers, 2013, p. 7). A Finnish study of households and their wood burning stoves bore this out. They wrote that "most of the reports of harvesting work show both joy and pride and a feeling of efficacy, (Jalas and Rinkinen, 2016, p. 57) not unlike some of the findings from the off-grid Canadian ethnographic study (Vannini and Taggart, 2014). Certainly, most of the committed practitioners put a lot more effort into their performances - such as putting washing on a line - but also appreciated the rewards that it brought that were not all financial.

9 Becoming a prosumer

Shove et al have explored the transition from being a practitioner of a practice to committing to it. They write that at the "moment when someone sees him or herself as a doctor or a drug-taker may prove to be a moment of no return: from that point on, their career is set" (2012, p71). At the outset of this research I found it difficult to imagine that the identities of the householders could become so

wrapped up with prosuming that it became part of them: a doctor or drug addict seemed to be of a different order of magnitude than shifting energy demand to coincide with solar production. And yet as the months unfolded I began to see a gradual metamorphism amongst the committed practitioners as during their daily paths they crossed back and forth over critical prosuming thresholds, shaping their performances as they went.

Thus for one family, aligning dominant projects with prosuming involved eating together during the week. This saved money on the prepayment meter as the oven was only used once rather than twice. In addition they also benefited from capturing any solar power that was being generated as cooking now primarily took place late afternoon rather than also in the evening. What was important about this adaptation of cooking practices was that it enhanced, not compromised, the Maintaining-Family-Routines Project. The practitioner maintained the children's' eating times and just brought forward the time she and her husband ate, enabling not only improved family time but also saving on the Feeding-the-Meter Project. As we saw earlier, this strategy was in marked contrast to the mother of older children who used the Prosuming Project to undertake bake and freeze days so that her teenagers could eat at times that suited their different daily pathways. But in both cases the Prosuming Project became embedded into their daily paths and their performances of different projects and practices.

Committing to prosuming also offered varying but significant rewards to the practitioners encouraging the morphing of project and practitioner. Thus for one mother, the realisation that she could afford to replace her children's school shoes when they wore out, was deeply significant. It encouraged her to find ways to continue saving money on her prepayment meter across the winter and, in the process, extending what it means to be a prosuming practitioner. However, the rewards were not just financial. The same woman also experienced enjoyment in stepping outside and hanging clothes on the line as a world apart from being stuck inside with the noise and heat of a tumble dryer, even if being run on solar power. For another, line drying was already an important part of her drying practices and she delighted in seeing the energy monitor turn green in the winter and being able to act on this to capture free solar power. This all reinforced the relationship between prosuming and practitioner, creating a symbiotic relationship rather than prosuming simply being seen as a voluntary, secondary project being squeezed into a daily path dominated by institutional projects.

But there were also more subtle transformations of practitioners. The woman who changed her laundering routines as she became more convinced of the Prosuming Project, and in the process became more assertive with her children. Now, if they wanted their clothes washed they had to undertake trips to the laundrette. Another, who became proud of her expertise as a prosuming practitioner - so much so that she stopped deferring to her husband about how best to use the solar

power. The committed prosumers also started to push at the boundaries of the project, although all the households, to varying degrees, challenged prosuming during adopting, establishing and committing stages. This included questions over accessibility and transparency: why was it that only a few hundred households were eligible for solar panels; who was benefiting from the excess solar power and why could it not be kept within a community that struggled to afford their energy bills?

4 CONCLUDING SUMMARY

This chapter explicitly looked at the overarching and subsidiary questions. Additionally, it explored the findings in terms of nine themes that explained how and why prosuming evolved for social housing tenants. I now move on to the final concluding chapter, which offers reflections and implications of the thesis.

CHAPTER 11

REFLECTIONS & IMPLICATIONS

1 INTRODUCTION

The **last chapter** examined in detail the key features of the Prosuming Project amongst a group of social housing tenants. It explored this in relation to subsidiary research questions and the three stages of the conceptual framework adopting, establishing, and committing. Additionally, the chapter synthesised these findings and found nine key themes as to why and how prosuming evolved within the context of the study.

This chapter addresses the contributions to knowledge and limitations of the research. The final section then briefly explores policy implications arising from the research.

In more detail:

Section 1 explores the study's contribution to knowledge. Firstly, it examines the theoretical contribution and development of a conceptual framework that examines the pathways of project-practitioners in the evolution of a project. Secondly, it addresses a number of empirical gaps by examining the phenomenon of the Prosuming Project through a Social Practice Theory lens, with the addition of Time Geography concepts. The case study was chosen as it fell within the top ten per cent of most deprived areas in England. Thirdly, the final contribution is to methodology and a set of insights and commitments to developing a social practice qualitative study within a disadvantaged community. I also highlight the engagement and impact work I have undertaken.

Section 2 examines the limitations to the findings. Firstly, how could I be sure that my findings are authentic and resonate with the interviewees? Secondly, how could I ensure that my study of seven households could be trusted to inform policy? Thirdly, what was the influence of seasons on the findings and interpretation of the conceptual framework?

Section 3, I address a number of policy concerns. Firstly, I explore a number of policy suggestions by examining the three key elements of the Prosuming Project: materials, meanings and competences.

Secondly, I look at the importance of prosuming practitioners being drawn from many different social groups not just those who can afford solar panels. I end the thesis by suggesting that a Shifting-Storing-Saving & Sharing Energy Project may not be so far in the future, and with that its potential to address sustainability winners and losers.

2 CONTRIBUTIONS TO KNOWLEDGE

2.1 Theoretical contribution

Despite the "practice turn", (Schatzki et al., 2001), Hui and Spurling (2013) argue there is still space for further theoretical and empirical consideration of how a social practice lens can explore the dynamic relationship over time between people, performances and practices:

> To date, the relationship between individual lives and social practices has too often remained peripheral…In order to consider issues of social change, and moreover to try and modulate the direction of this change, further theoretical and empirical exploration of the multiple coevolving timelines and trajectories of individuals and practices is a valuable next step (Hue and Spurling, 2013, p. 11).

In order to address such issues I developed a Social Practice Theory conceptual framework that also drew on ideas from Time Geography. This dynamic framework focuses on project-as-performances, and foregrounds both people as practitioners and practices. It explores pathways for practitioners across three evolving stages: adopting, establishing and committing to a project. It also recognises that project-practitioners are not simply carriers of practices but can orchestrate them, alongside mobilising and integrating elements, in the fulfilment of a project during their daily and life pathways. This framework builds on and extends from previous work by a number of SPT scholars (e.g Hui and Spurling, 2013; Shove et al., 2012; Spurling, 2010, 2009; Watson and Shove, 2008). As Shove et al remind us, as social practice practitioners we build on past performances - our own and others - to contribute to the unfolding entity of the 'practice turn':

> Like the practitioners and everyday innovators about whom we write, we appropriate ideas from here and there, making new connections between existing arguments as required (Shove et al., 2012, p. 8).

In keeping with this notion, the conceptual framework also evolved over the course of this study. The interviews with the seven solar PV householders highlighted the significance for the Prosuming Project of two dominant, institutional projects: Feeding-the-Meter and Maintaining-Family-Routines. What also emerged from this study was the "competing and conflicting demands" (Hui and Spurling, 2013, p. 11) amongst projects to find space in daily pathways, and the need for prosuming as a secondary, voluntary project to align itself with dominant, institutional projects. By the committing stage of the conceptual framework, prosuming had started to be knitted together with Feeding-the-

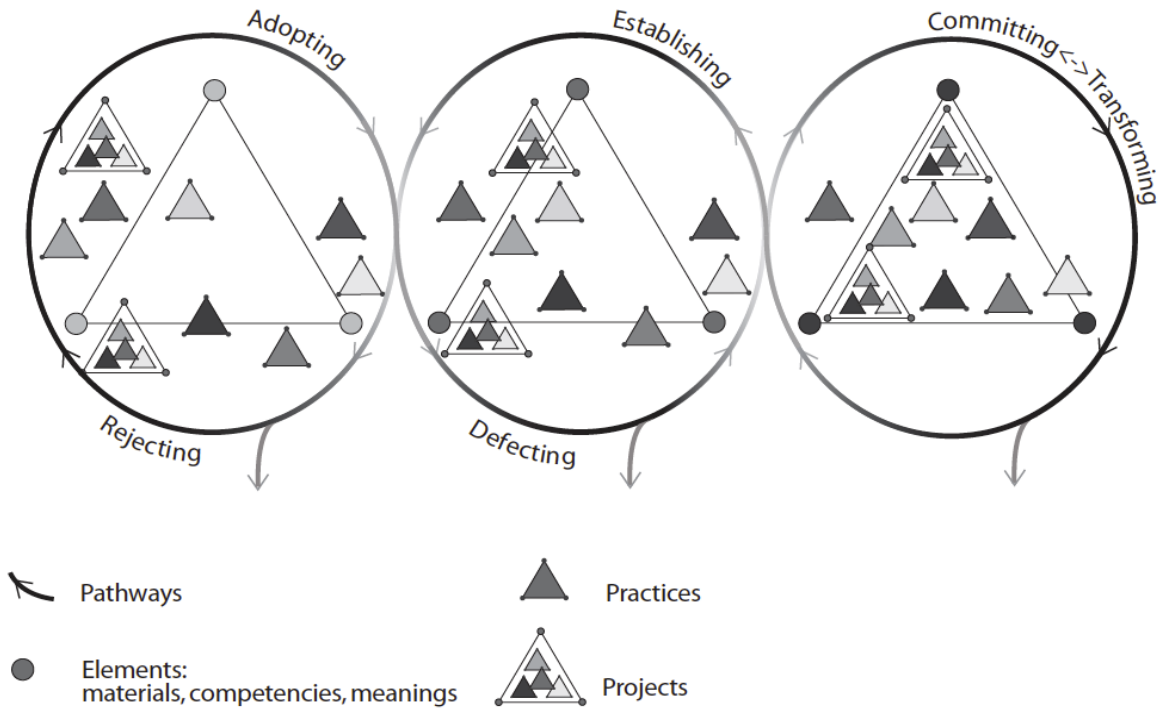
Meter and Maintaining-Family-Routines. Given this, I adapted the original conceptual framework developed in Chapter 2 to a revised framework in Figure 3, which includes the orchestration of projects as well as practices, by project-practitioners.

In summary, the theoretical contribution to knowledge helps to address the gap identified by Hui and Spurling (2013) for the need to explore the relationship over time between people, performances and practices. In order to address such issues I developed a Social Practice Theory conceptual framework that also drew on ideas from Time Geography. This dynamic framework focuses on people as project-practitioners that mobilise elements and orchestrate practices and projects over three stages: adopting, establishing and committing to a project. In so doing they navigate dominant, institutional projects, as well as secondary, individual ones, in their pursuit of the fulfilment of a project in daily and life pathways. The framework was developed by drawing on existing literature alongside the empirical findings of the research.

Figure 3

Project-Practitioner Pathways

Mobilisation of elements & orchestration of practices and projects



Source: Own (inspired by Hagerstrand, 1982; Hui and Spurling, 2013; Pred, 1981, 1981a, 1981b; Shove et al., 2012; Watson and Shove, 2008)

2.2 Empirical contribution

Chapters 1, 2, and 3, highlighted a number of empirical gaps that this research has sought to contribute to. Broadly, these covered the following areas:

- There are a number of UK studies that focus on solar PV, but few explicitly frame their study in terms of the concept of prosuming (Ellsworth-Krebs and Reid, 2016).
- Those solar PV studies that do focus on prosuming, rarely examine how it evolves over time, or the day to day lives of prosumers (Hansen and Hauge, 2017).
- The three prosuming studies that included a practice inspired approach (Ellsworth-Krebs and Reid, 2016; Hansen and Hauge, 2017; Olkkonen et al., 2016) all focused on a rural rather than urban context, and owner occupiers rather than tenants.
- There are a lack of social practice empirical studies that explore variations in performances and diversity of practitioners (Gram-Hanssen, 2014; Hitchings, 2013; Walker, 2015, 2013).
- Linked to this is the lack of social practice studies that explicitly explore households that may end up as 'losers' not 'winners' in a future sustainability race (Walker 2013).
- There is also a dearth of social practice studies that examine difficulties in accessing certain social practices (Walker, 2013).

This thesis directly engages with these empirical gaps by examining the phenomenon of the Prosuming Project through a Social Practice Theory lens, with the addition of Time Geography concepts. The case study was chosen as it fell within the top ten per cent of most deprived areas in England (DCLG, 2015). Given this, I have a number of empirical contributions to knowledge that, while overlapping, can be broadly defined in three key areas:

The **first empirical contribution** is an in depth examination of prosuming of solar power amongst households across four seasons. Unlike the other prosuming studies identified in Chapter 1, this study includes research prior to the installation of solar panels to understand the practices and projects that are relevant to becoming prosuming practitioners, and how these evolve over the course of ten months.

The **second empirical contribution** lies is the context of the study. As far as I am aware, there are no other qualitative studies that explore the evolution of prosuming within a disadvantaged community with multiple deprivation indices. My study offers insights into the lived experiences of households with prepayment electricity meters who become practitioners of a Prosuming Project. As Middlemiss & Gillard (2015) have highlighted, there are only a scant number of UK empirical studies that examine energy vulnerability from a 'bottom-up', lived experiences perspective. While this

research was not designed to explore energy vulnerability, given that this could take up an entire study on its own (e.g. Middlemiss and Gillard, 2015), it still offer insights into the lived experience of families undertaking the Prosuming Project, within the context of a low income estate. In so doing, it also engages with potential 'losers' rather than the 'winners' in a future sustainability race by exploring difficulties in adopting the Prosuming Project as well as sustaining performances (Walker, 2013).

Finally, **the third empirical contribution** lies in a study that offers an opportunity for examining variations in performances. Despite a fairly homogenous sample, what emerged from the findings was how performances changed over time. Broadly three types of prosumers emerged that were connected loosely to the three evolutionary stages of a project. These consisted of 'tentative prosumers' during adoption; 'periodic prosumers' during establishing; and the 'transformative prosumers' during the committing stage. Together they form a dynamic typology of prosuming project-practitioners as highlighted in Table 9 below. The findings build on the research of Abi-Ghanem and Haggett (2011) who identified a typology of solar PV users. However instead of taking a snapshot of an individual prosumer at any one point in time, my research tracks how practitioners change as they develop a dynamic relationship with the Prosuming Project. Thus transformative prosumers have already passed through being tentative and periodic prosumers. However, similar to Schot's work on a typology of energy users, the role of prosumers are "not static or exclusive you may flow between groups" (2016, p 1). Practitioners may well move between the broad prosuming categories as commitment fluctuates depending on what else is happening in their daily paths. For example, Frankie moved, almost overnight, from being a periodic prosumer to a transformative prosumer once she had access to a solar energy monitor.

My typology helps to address an empirical gap in social practice literature concerning variations in performances and diversity of practitioners, as well as contributing to knowledge around producing and consuming of solar power. It also helps to address a wider issue of energy studies failing to see differences in 'fuel poor' households as highlighted in a study by Jenkins et al (2011):

> The results suggest that categorising such a large number of dwellings and families into one large 'fuel poor' group risks ignoring the range of responses to fuel poverty by different tenants (Jenkins et al., 2011, p.2).

Given this, I wanted to make sure that I did not lose sight of the individuals in the study. Thus, I have liberally quoted from them ensuring the thesis is underpinned by rich, thick descriptions of their lived experiences of the Prosuming Project. In Appendix G, I go further and summarise the prosuming journeys of each of the main interviewees across the three stages.

Table 9 A Typology of Prosuming Project-Practitioners

TENTATIVE PROSUMERS	PERIODIC PROSUMERS	TRANSFORMATIVE PROSUMERS
1 Experimental [16] *2.Cautious* [17]	*1 occurring repeatedly from time to time* *2 occurring or recurring at regular intervals* [18]	*"Causing a marked change in someone or something"*[19]
The tentative prosumers all experimented, to varying degrees, with the Prosuming Project using their prepayment meters before adopting it. It was important that they could see how it would support the dominant Feeding-the-Meter Project. However, the tests also helped to mobilise the necessary elements needed for their performances - for example developing embodied know-how. Additionally, for all but one of the households, this stage was marked by a period of uncertainty about the Prosuming Project given that at the outset it was seen as more associated with affluent home owners than social housing tenants. The tests helped to reassure them that the Prosuming Project could be of value to their daily lives. The one person who was not uncertain at the outset knew someone in social housing who was a prosuming practitioner and already knew the difference it could make to the Feeding-the-Meter Project. **Note A prosumer is defined as deliberately and simultaneously producing and consuming solar power. This involves the mobilisation of elements and the orchestration of elements, practices and projects**	Following adoption of the project, the practitioners all eventually segued into the establishing phase. This was initially marked by practitioners performing the project as and when it fitted round their daily paths. As the prosumers gained confidence and could see the benefits to the Feeding-the-Meter Project, so they made their performances more regular. However, they still did not fully immerse themselves in the Prosuming Project and chose to orchestrate practices such as washing and drying clothes, only when it fitted around other family, work and individual projects. Cooking practices were rarely performed as part of the Prosuming Project as for most of the households it was too disruptive to the important Maintaining-Family-Routines Project. During this phase the practitioners split into two: those who started to perform the project more regularly and eventually segued from the establishing phase to the committing phase; and the others who remained conducting their performances as and when it suited them. There was a tendency to align the Prosuming Project with good weather that invariably fell across summer and as winter set in, some of the practitioners took a break from their performances only to start again when the weather improved in the spring. This group of practitioners became, in effect, seasonal periodic prosumers.	The practitioners who committed to the Prosuming Project did not know whether the Prosuming Project could be performed over the winter so they turned again to experimentation, to varying degrees. What they discovered was that if they kept up their adapted routines, they would still be able to perform the Prosuming Project over the winter, albeit with less financial savings than the summer. By making a commitment and embedding new routines into their daily paths, it also made it easier to closely align the Prosuming Project with the two dominant projects: Feeding-the-Meter and Maintaining-Family-Routines. As the prosumers committed to the Prosuming Project, so they transformed themselves as practitioners. This took place as they crossed the critical thresholds of knitting together the secondary, voluntary project with the two dominant institutional projects. But practitioners also passed through two additional thresholds: gaining internal and external rewards from prosuming, and the chance to be innovative in their performances. Practitioners underwent different degrees of transformation – in particular increase their wellbeing from reducing the stress of trading one valued social practice against other. However, the Prosuming Project also underwent a transformation in just ten months by beginning to turn into an Energy Shifting, Storing, Saving & Sharing Project.

[16] http://www.dictionary.com/browse/tentative

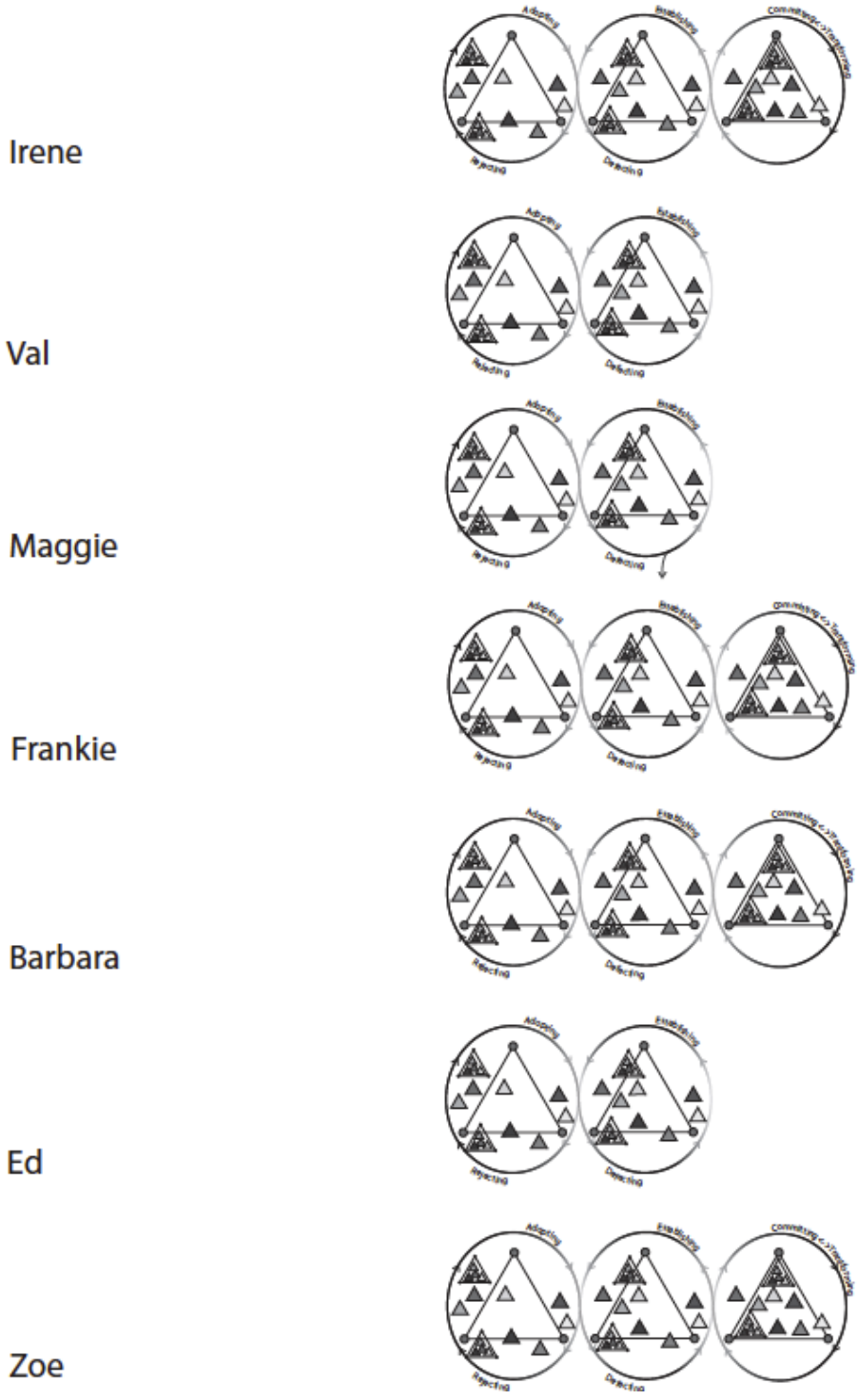
[17] - https://www.collinsdictionary.com/dictionary/english/tentative

[18] www.merriam-webster.com/dictionary/periodic

[19] https://en.oxforddictionaries.com/definition/us/transformative

Additionally, I have produced a visual depiction of how each of the prosuming practitioners evolved across the three stages evolved in Figure 4 below:

Figure 4 - Pathways for Prosuming Project-Practitioners



In summary, the empirical contribution to knowledge is focused on an in-depth examination of prosuming of solar power amongst social housing tenants across four seasons. As far as I am aware, there are no other qualitative studies that explore the evolution of prosuming within a disadvantaged community facing multiple deprivation indices. In so doing, it also engages with potential 'losers' rather than the 'winners' in a future sustainability race by examining difficulties in adopting the Prosuming Project, as well as sustaining performances (Walker, 2013). It also offers insights into their lived experiences and the variations in performances across three stages: adopting, establishing and committing to the Prosuming Project. This resulted in the development of a typology of three types of project practitioners - tentative, periodic and transformative prosumers.

2.3 Methodological contribution

Warde has highlighted that the philosophical origins of Social Practice Theory did not easily lend itself to an empirical setting given that "as general theories of practice they tend to be idealised, abstract and insufficiently attentive to the social processes" (2005, p. 135). The focus on practices rather than people as the analytical unit of enquiry also make it difficult to develop a set of 'off the shelf' methods that can be applied empirically:

> When practice and its social constitution, rather than individuals and their behaviours, are centre stage there is no comparably well-defined package of research design and no ready-made repertoire of methodological tools ready and waiting for the practice-based researcher to pick up and deploy (Social Practices Research Group, 2012, p. 3).

Shove also asserts that it is the research puzzle and questions that determine a methodology, not the underlying theory (Shove, 2017). Part of the research puzzle that underpinned this study was the potential for Social Practice Theory to offer insights into disadvantaged communities - in particular the future sustainability 'losers' (Walker, 2012). Given this, I needed a methodology that could explore prosuming within a low-income social housing estate. Middlemiss and Gillard's (2015) paper on exploring the meaning of energy vulnerability through 'lived experiences' was instrumental in helping turn my conceptual framework into an empirical case study. They argued that flexible, bottom up qualitative methods can potentially reveal lived experiences of energy vulnerability and, with that, a richness of data and authenticity that would be difficult to find in more, top-down quantitative research). Their approach also reflected Walker's premise that social practice studies that shine a light on inequality issues need to address "the lives that people can actually live...or do not manage to live" (Sen 2009, cited in Walker, 2015, p. 51.

While I was not directly examining energy vulnerability, I was interested in the influence of the Prosuming Project on the lived experiences of families from a low-income community. For example,

what difference did solar power make to such households that lived under the threat of being cut off from electricity if they did not keep their prepayment meter in credit? Additionally, while, I was also not looking for an 'off-the-shelf' (Social Practices Research Group, 2012) methodological approach to conducting a social practice study, I could see the benefit of Hue's (2014) call for a set of resources to support the empirical exploration of practices in different social contexts. Given this, I have captured the learning from my social practice study of prosuming-practitioners from a disadvantaged community in two tables.

The first, Table 10 summarises a number of methodological insights that have been informed by the experience of conducting the study as well as the various cited scholars. Following this, Table 11 offers a set of seven commitments that also emerged from the research and literature. This addressed issues of trustworthiness of the research, as well as the importance of recognising the responsibility researchers have to interviewees, particularly when working within a disadvantaged community.

Both the methodological insights and seven commitments evolved iteratively over the course of study, but are also not intended to be in any way prescriptive. Instead, they offer an opportunity to share the learning I have gained from carrying out qualitative longitudinal research into social practices and projects within a disadvantaged community. I also offer them up as a contribution to the set of resources that Hui (2014) has called for to investigate social practice empirical studies in different social contexts, and hope my experiences will further inform the debate she has raised.

In summary, I have responded to Hue's call (2014) for a set of resources to support the empirical exploration of practices in different social contexts. I offer up two contributions to such a resource. The first is a list of methodological insights that arose from the literature, as well as from my experience of conducing a social practice study in an area with high deprivation indices. The second is a set of seven commitments that addressed trustworthiness in terms of the research findings, and the responsibility I felt I had to the interviewees given the social and economic context of the research. This material evolved iteratively over the course of study, again both from the literature and the empirical study. Neither contribution is prescriptive and both are shared in the light of wanting to further open up this debate.

Table 10 Methodological insights

Researching 'lived experiences' of the Prosuming Project with a social housing estate

1. Qualitative research can give thick, rich descriptions to explore a different reality and "offer a sensitivity to the issues at hand that cannot be obtained from theory"(Flyvbjerg, 2006, p. 23).
2. As Bonevski et al highlight "researchers continue to struggle to access, engage and retain participants from socially disadvantaged groups" (2014). In challenging this, it is also important to consider not only methods of access but also research methods. Both need to be seen through the eyes of the research participant. E.g. in my study household energy walks felt too intrusive compared with interviews.
3. Serial interviewing can enable trust to develop between interviewer and interviewee over time (Hitchings, 2012). However, this also needs to be set against time commitments and reciprocity (Lincoln et al., 2011).
4. Bottom-up data gathering - "in a relatively unstructured way allowing research participants to contribute their own categories and ideas to the research" (Middlemiss and Gillard, 2015, p. 148).
5. Developing "conversations with purposes" (Webb and Webb, 1932, cited in Legard et al., 2003, p. 138) through semi-structured interviews. This could be helped by drawing on a check list of potential issues to discuss rather than set questions.
6. Creating vulnerable texts (Crang and Cook, 2007) offers an opportunity to better understand the lived experiences of interviewees in their own voices.
7. Considering issues of trustworthiness given that knowledge is partly created through the relationship between interviewer and interviewee (Lincoln, 1995).
8. Recognising that as researchers "our primary responsibility is always to our informants" (Clark and Sharif, 2007, p. 400), however difficult that might be when faced with certain academic challenges.
9. Developing a set of commitments to the research (Lincoln, 1995) by making transparent issues of trustworthiness and responsibility.

Source: Own but inspired by the cited authors.

Table 11 Seven Research Commitments
Addressing Trustworthiness and Responsibility within the context of a low income community

1 Sharing the journey

As qualitative researchers we are not expecting others to replicate our findings, but we can at least "explain how we arrived at the results" (Dey, 1993, cited in Merriam and Tisdell, 2015, p. 252). This commitment is to be transparent about the process including what worked and what did not. For, as Ellingson highlights, "the entire journey 'counts,' not just the good parts..." (2009, p. 177).

2 Self reflection

This is concerned with what researchers bring to a study and the importance of awareness and transparency. Self-reflexivity offers a way of exploring "our fieldwork relationships" and how they have influenced the research, rather than sweeping it under the carpet of neutrality (Pink, 2006, p. 367).

3 Embedding ethics

This is being aware of the difference between "procedural ethics" as undertaken in an ethics review, and those "ethically important moments" that often arise at unpredictable points along the research journey (Guillemin and Gillam, 2004, p. 262). Learning from both needs to be embedded throughout the research process.

4 Confronting contamination

As qualitative researchers, engaging with interviewees is part of the process of knowledge creation rather contamination. As Ratcliffe (1983) writes "one cannot observe or measure a phenomenon/event without changing …" (cited in Merriam, 1998, p. 20). What is important, is being able to reflect on this and its meaning within the context of the research.

5 Questioning methods

This is critical for any research design,- but even more so within the context of working within a disadvantaged community. As researchers, we need to interrogate our methods to ensure they not only meet the requirements of the study but they also respect participant's needs (Clark and Sharf, 2007).

6 Making a difference

Lincoln (2011) makes a distinction between scholars who see action arising from research as undermining rigour, and those who see it as integral to the inquiry process. This research was developed within a socially and economically disadvantaged community and I felt it was morally important to share the findings beyond academia (Liebenberg and Ungar, 2009).

7 Different genres

In order to further share the findings I drew on crystallisation as a concept. Ellingson advocates that crystallisation should involve at least one other genre to an academic output, in order to give a "wide angle view of the setting or phenomenon"(2011, p. 10).

2.4 Engagement & Impact

One of the commitments I made to the research was to do my best to 'make a difference', as well as draw on different genres. This is discussed in Chapter 5 while the various engagements I undertook are summarised below.

2.4.1 Discussions with three local authorities

I worked with three local authorities to share some of the findings that were most relevant to them. This included giving them direct feedback from the tenants involved in my research as well as producing a booklet and leaflet for them.

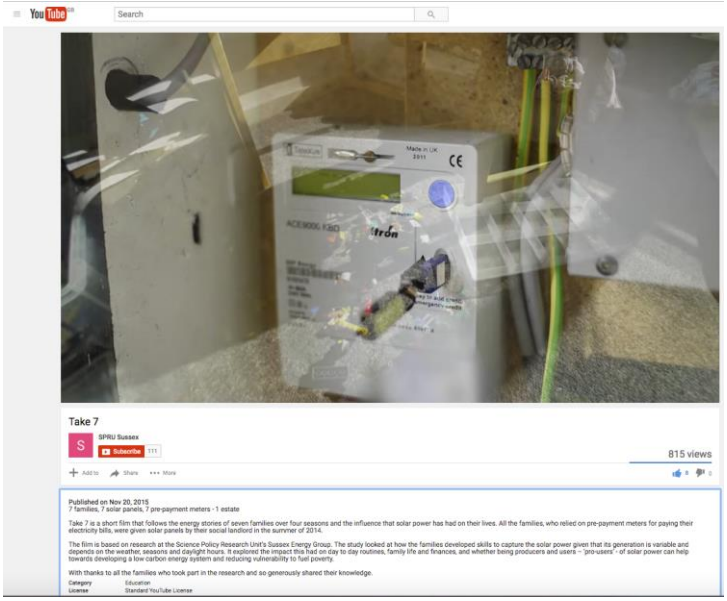
2.4.2 Booklet and leaflet

I produced a 10 page booklet in collaboration with the social housing tenants in the study and their landlord who was also the Local Authority for the area. This was distributed to several hundred solar PV households in the community covering the two stages of the social housing programme. In addition, the booklet was used as a basis for a four page leaflet that I produced in collaboration with two other local authorities that also was delivered to solar PV social housing tenants. In order to reduce the potential for identification of interviewees I have not referred to the local authority partner or estate where they lived. Thus I have not attached the booklet or the leaflet as it names the three local authorities I worked with.

2.4.3 Take 7 YouTube film

The production and distribution of the film is discussed in Chapter 5. In essence it was originally produced for an ESRC Festival of Science public event on fuel poverty. The film was then released on YouTube as well as twitter. The following is a screen shot, while the film itself can be access at url: https://www.youtube.com/watch?v=Ew1aYAzRIz0

Figure 5 Still image from YouTube film



3 LIMITATIONS OF THE FINDINGS

I have tried to be reflective throughout my research including considering its limitations, as discussed in Chapter 5. As discussed and summarised above, this included producing seven research commitments to highlight issues of trustworthiness and responsibility. This process has helped me to further reflect on the limitations of the research. Firstly, how could I be sure that my findings were "sufficiently authentic (isomorphic to some reality, trustworthy, related to the way others construct their social worlds."(Guba and Lincoln, 2000, p. 205). Secondly, how could I ensure that my study of seven households could be trusted to inform policy (Guba & Lincoln, 2005). Thirdly, I was concerned about the timing of the fieldwork in terms of the seasons and how this may have influenced the practitioner pathways. Below I discuss these issues, as well as how I have addressed them:

3.1 Addressing authenticity

When developing a parallel universe of projects, practices and practitioners it would be all too easy to lose sight of how far such abstract ideas resonate with the people I was researching. How did I know that the three projects that have emerged from research: prosuming; feeding-the-meter and maintaining-family-routines were authentic? (Guba & Lincoln, 2005). To address this, I explored whether the project made sense (Christensen and Røpke, 2005). In other words if I sat down with the main interviewees and discussed the three projects, would they also recognise them? Yet such an approach also presented a methodological challenge. I felt that there was a risk of moving the discussions away from the lived experiences of the Prosuming Project, to a more theoretically dominated agenda. In other words my agenda not theirs. The households were interested in sharing their experiences of prosuming, they had not signed up to discussing abstract ideas. Given that one of the commitments highlighted in Chapter 5 was in prioritising participants, I decided not discuss the idea of projects with them directly. As a potential limitation in the research, I looked at three ways of filling in this knowledge gap:

Drawing on the case study

The more I studied the data, the more I found that I could not ignore the issue of the prepayment meter and family routines. I would go further and argue that the dominant, institutional projects of Feeding-the-Meter and Maintaining-Family-Routines found me, rather than the other way round. My initial conceptual framework in Chapter 3 focused on the orchestration of practices in the fulfilment of a project. But by trying to understand the lived experiences of practitioners, I discovered that the conceptual framework was not entirely matching what I was seeing on the ground. I was hearing about the concern of keeping the prepayment meter in credit - 'feeding it' - and the delight in finding

that solar power could help with this. Additionally, I was also hearing about the importance of routines to family life and good parenting. Even if free solar power was available, households would not disrupt their children's routines by cooking dinner earlier.

Both prepayment meters and family routines were deeply embedded in the day-to-day lives of the households in the study and both had implications for prosuming. They were also involved in a series of activities to fulfil (Pred, 1981a). For example, in the case of the Feeding-the-Meter Project this included limiting electricity use, keeping an eye on the prepayment meter and going to the shops to buy credit for it. I also had the opportunity to explore with the households an overview of producing and consuming solar power when discussing the booklet with them. While we did not talk in terms of a project, we discussed the different activities associated with using solar power. All this evidence pointed to the conclusion that prosuming, Maintaining-Family-Routines and Feeding-the-Meter would all make sense to the main interviewees as projects.

Drawing on the literature

The findings of the case study were also backed up by drawing on the literature. The ethnographic study of off-grid Canadian households was valuable in giving me a sense of what a Prosuming Project could look like, and how households related to it (Vannini and Taggart, 2014). Additionally, two papers exploring family routines were also helpful in identifying the potential for a Maintaining-Family-Routines Project (Christensen and Røpke, 2005; Nicholls and Strengers, 2015). In terms of prepayment meters there were numerous papers I read as background reading that gave me a sense of how this payment method was closely tied up with daily routines and also could be a potential project (e.g. Anderson et al., 2010; Gregory, 2015; Purcell, 2014).

Critically, the more I realised the significance of the projects to the lived experiences of the families in my study, the more I realised that they were missing from my conceptual framework. This was reinforced by going back to the Time Geography literature and seeing how projects could be made up of other projects and practices – Hagerstrand's analogy of "Chinese boxes" (Hagerstrand, 1982, p. 336) and Pred's sub-projects and off-shoots (Pred, 1981, p. 237). While my empirical findings showed a much closer knitting together of dominant and secondary projects than this, the literature reinforced my decision to change the conceptual framework to include the orchestration of projects as well as practices by project-practitioners.

Drawing on my own experiences

I also realised that although I did not feel it was appropriate to have an abstract conversation with the interviewees about projects, I had my own experiences that I could draw upon. Like Hagerstrand

(1982), I could look back on my life and now see it through a project lens. I had grown up with a prepayment meter, as well as in a family that had its own routines including a strict bedtime as a child. Looking back I can now see that my whole family took part in a 'Feeding-the-Meter' Project. As the preface to this thesis highlights, in our case it was keeping on top of the 50 pence coins that were needed, and the balancing act of ensuring that the electricity did not get cut off at an inopportune moment. My mother also made efforts to keep our routines as consistent as she could – and this often went hand in hand with keeping the meter stocked up with 50 pences. Very little electricity was needed if everybody had an early bedtime. Arguably, like the prosuming practitioners from this study, this combined good parenting with helping to support the Feeding-the-Meter Project.

3.2 Addressing policy concerns

In Chapter 5 I reflected on how comfortable I would feel for my research to be used to construct social policy (Guba and Lincoln, 2005). Given that I had developed this study in collaboration with a social housing landlord who was also the Local Authority for the area, it was a real issue to consider. Originally, I had discussed with the Local Authority reporting back on my findings once I had completed the PhD. However, halfway through the fieldwork a council officer contacted me to see if I could offer some early insights as they were already planning the second stage of the solar PV roll out programme. I faced two potential issues that limited how useful the research could be. Firstly, that I had not finished my field work. Secondly, that the research was a case study based on seven households so there was a wider issue around generalisability.

Both issues are discussed in the section 'Making a Difference' in Chapter 5. The first issue did not transpire to be a problem. When I examined the data I had already collected, I found I had a wealth of material that was relevant. In particular, I had insights from the families about how they would improve a solar PV programme roll out so I could feed this directly back to the landlord. For the second issue, generalisability, I made it clear to the Local Authority that my study was not based on a statistically valid sample, but a case study using qualitative methods. It had never been my intention to draw on statistics, but instead to offer a " 'truth' that is located within particular communities at particular times, and used endemically to present their condition"(Gergen and Gergen, 2007, p. 470). I explained that the study set out, and delivered, rich insights into the phenomenon of the evolution of the Prosuming Project within a social housing estate over four seasons. Additionally, the study sought to explore the difference the Prosuming Project made to the daily lives of prosumers from seven households.

When I discussed my findings with the social housing landlord, I gave them the context in which they were produced, and rich, thick descriptions from the anonymised interviews. It was then up to the council to decide how transferable the findings were from my study to another solar PV roll out programme within the same community as highlighted by Guba and Lincoln:

> Transferability, roughly parallel to external validity, established not by the evaluator but by receivers of evaluation reports who make personal judgments of the degree to which findingsare sufficiently similar to their own situations (judged from the thick description) to warrant testing for the viability of local applications (Guba and Lincoln, 2001, pp. 13–14)

As the researcher, I felt that there was considerable transferability that could be of use in a new solar programme within the same community. The social housing landlord came to the same conclusion and we addressed a number of the issues raised by their tenants in the research by co-producing the booklet. Additionally, two other local authorities also came to the same conclusion even though their solar PV programme was in a different community.

By shining a light on these issues, I could also see that the findings had limited applicability to home owners who had purchased their own solar PV systems. For example, the prepayment meters were a central material element in the evolution of the Prosuming Project and how practitioners became prosumers. For household who relied entirely on quarterly bills, the findings may well look very different. This was also what a number of the interviewees felt in my study. While there may be some overlap between the experience of being a prosumer as a social housing tenant and a home owner, this would require an additional study to focus in on the latter.

3.3 Addressing seasonal influences

The final issue that concerned me was the relationship between the timing of the fieldwork and the different stages of the project given the significance of seasons to solar power generation. Were the research findings limited because of the impossibility of untangling the project pathways taken by practitioners and the seasonal influences?

Firstly, again I went back to the literature. The three stages were primarily inspired by the work of Shove et al's (2012), but also other scholars including Hui and Spurling's (2013) papers on careers and practices. Additionally, I had been influenced by Walker's assertion of the dearth of social practice studies that questioned the recruitment of practitioners – hence highlighting the tension between adoption and rejection. Having relooked at this social practice literature, I still felt that the three stages, adopting, establishing and committing, were valid and applicable to projects as "meta-practices" (Røpke and Christensen, 2012. p.351).

Secondly, given that I felt the conceptual framework was robust, I needed to look at how I had applied it empirically to the Prosuming Project. The issue here was that I was investigating a project that was closely tied into the seasons. Although the project could be performed all year round, solar power generation is at its height over the summer months and lowest in the winter months (University of Sheffield, 2017). This raises a host of potential questions. For example, would more practitioners have committed to prosuming if they had longer to perform the project before the seasons changed from autumn to winter? Or would more people have rejected the Prosuming Project at the outset if adoption occurred during winter? As the study was not conducted in a vacuum and seasonal changes were an influence on all the practitioners, including those who became periodic and transformative prosumers, the question is impossible to answer with the methodology I used. This is another potential limitation of the research.

However, I realised that these concerns reflected my earlier discussions in Chapter 5 that if somehow I was able to construct the perfect methodology I would be able to avoid compromising the data – 'contaminating' it in some way (Edwards and Holland, 2013). As then, I have also concluded, that this belief stems from a positivist paradigm. While it is important to reflect on the research and try and mitigate any limitations, what is more important is being transparent about this process.

Thirdly, given this, I then reflected on how the findings might have changed had the solar PV programme started in a different month – for example January rather than July. For example, Sheffield University's website[20] highlights how in July 2017 solar irradiation from its solar farm was eight times higher than in January of the same year. If households in my study had been faced with adopting the Prosuming Project in winter rather than summer, it may well have influenced the pathways they took. For example, as the study has demonstrated, it was much harder to see the difference the Prosuming Project was making to the Feeding-the-Meter project in the winter compared with the summer. Thus practitioners may have taken longer to develop embodied knowledge because of the lack of sunlight, or even reject prosuming as a project.

In considering these issues I again went back to the interviews I had conducted and found a particularly helpful insight from Barbara. She had highlighted her concern that a friend who had been given solar panels in the second roll out programme, would struggle to see the benefits because they had been installed during the winter rather than the summer. She took it upon herself to tell her friend not to give up too easily as she would start to see the financial benefits as the weather improved. Barbara recognised it was much easier to start prosuming over the summer as financial gains were

[20] https://www.solar.sheffield.ac.uk/panel-data/

much more apparent than the winter. As she pointed out, "You wouldn't know if you going to gain, if you're not gaining."

So undoubtedly the timing of the solar panels could influence the pathways that practitioners take. It may well be harder to adopt in the winter, or simply take longer. In an ideal world I would have carried out an additional study that followed a group of households who had solar PV panels installed during the winter as part of the council's second roll out programme. This would have been an opportunity to explore how closely the project-pathways were associated with the time of year. However, given this would have turned a ten month study into one taking at least double that - it was not feasible with my limited resources and the PhD timescale. However, this is an area that would be worth looking at for future studies.

So although this is another possible limitation in the research, it has been addressed by remaining open to the different influences on the pathways that practitioners take. For example, the influence of social networks on practitioners as was discussed in Chapter 7 during the adoption phase. Barbara was an excellent example of this, warning her friend to not give up too early on the Prosuming Project. Another is the demand of institutional projects on the busy daily paths of practitioners. Maggie adopted the Prosuming Project in the height of summer and immediately saw the benefits, but defected for a number of reasons not least because of issues she was facing with her child's schooling. In her case the seasonal influences appeared irrelevant. Equally, the ability to mobilise elements is also instrumental in practitioner pathways. As Barbara highlighted "How are you going to get the best use out of them if you really didn't know how?" Val too discussed how one of her friends was not benefiting from the solar power because she had not really understood how to use them – in her case they had been installed over the summer:

> She's like 'I ain't making nothing, blah, blah, blah.' But it's because she's washing like every single day, and she's not doing it during the day, she's just doing it like seven o' clock, eight o'clock at night. And I'm like, 'Well that's the reason why.'

This last issue highlights that whatever the season it is important that households are able to mobilise the competence element - knowledge - to become and to sustain themselves as prosuming practitioners. I now turn to the final section of this thesis that briefly explores the policy implications of this research.

4 POLICY IMPLICATIONS

4.1 The Prosuming Project

This research has highlighted that social housing tenants are not only able to adopt the Prosuming Project when able to mobilise elements that suit the context of their lives, but they can also become transformative prosumers. For this to happen, they needed to not only orchestrate practices and projects, but also to mobilise an evolving set of elements across the three project stages - adopting, establishing and committing. Below I touch on some policy issues organised around the three core elements: materials, competences and meanings:

4.1.1 Material

As a prosuming solar practitioner it is essential to have access to the material element of PV panels. While a Google search reveals that it is possible to install DIY solar panels[21] there are potential health and safety risks with such a large electric installation, apart from the fact that social housing tenants also do not own their own homes let alone roofs. Additionally, only solar panels that are installed by companies regulated by the Microgeneration Certification Scheme are eligible for the Feed-in-Tariff ("Microgeneration Certification Scheme - Home," n.d.). Given this, and the fact that the cost of installing regulated solar panels still runs to thousands of pounds (Energy Savings Trust, 2017a)(Ingrams, 2017), this material element is currently beyond the budget of many people, let alone households living within a disadvantaged community (DCLG, 2015). Without this material element, there is no point in individuals trying to mobilise the rest of the elements because it would still be impossible for them to become a prosumer.

The only reason why the seven households could even consider adopting the Prosuming Project was because their social housing landlord had paid for the technology. Yet with progressive Feed-in-Tariff cuts, social housing landlords have had to question the financial viability of investing in solar panels for their tenants, and programmes have stalled (Howard, 2015; Tingey et al., 2017,Vaughan, 2016). This national picture also reflects what happened in this study, as the social housing landlord originally hoped to reach over 1000 households with solar panels, but ended up with less than around 300.

Another material element that was key to the evolution of the Prosuming Project was the prepayment meter. This supported practitioners in acquiring the know-how they needed to perform prosuming.

[21]https://www.google.co.uk/search?q=build+own+solar+panels&oq=build+own+solar+panels&aqs=chrome..69i57j0l5.4106j0j7&sourceid=chrome&ie=UTF-8

However, the solar energy monitor offered real time information on energy consumption and generation. This may well help families gain all year benefits from the Prosuming Project – albeit considerably diminished in the winter. For households living in economically disadvantaged communities, savings, however small, could make a difference to their day to day lives. As addressing fuel poverty was an objective of many of the social landlords who have invested in solar PV, an energy monitor could potentially turn the Prosuming Project into an all year round activity for more tenants (Changeworks, 2014) However, additional research would be needed to explore this further.

4.1.2 Competence

My study revealed that while knowledge sharing between the solar installer and the households took place, its effects were varied. While a couple of the households found the one-to-one meetings with the solar installers helpful in understanding how to use their generated power, others found them less useful. This was also the case for the written information. Instead what emerged was the need for a more comprehensive understanding of knowing energy (Maller, 2015; Royston, 2015) such as:

Know-what

This should be a jargon-free explanation of how to benefit from solar power. For example, the importance of sequencing routines such as putting the washing machine on once the oven has been turned off.

Know-how

Learning through doing is invaluable. The research suggests that summer is the optimum time to install solar PV panels on households with prepayment meters, as households can immediately start to see the difference in their electricity costs. However, if this is not possible, then a solar energy monitor would support a winter installation as it offers real time knowledge of solar energy generation and consumption. Arguably, such a monitor would be useful all year round, including for households who do not have prepayment meters.

See-how

Seeing prosuming in action can be a good way of learning. A solar energy monitor can offer this, but even a solar generation unit can at least show a practitioner when they are producing energy. Thus it is important such units are accessible to practitioners, rather than situated in the loft as in my study.

Sense-how

The sun successfully acted as a visual cue over the summer and to some extent the autumn, but proved problematic as winter set in. A solar energy monitor can act as an additional sensor, particularly useful over the winter when the sun is a less reliable cue. The more experienced

practitioners become, the more embodied knowledge they acquired and the less they needed to look at the prepayment meter or solar energy monitor.

4.1.3 Meaning

This is the element that is most likely not to be on the policymaker's radar. This is not surprising given that for many of the households, their first encounters with prosuming was via the media. Such encounters generally fell into two camps - grand eco houses or how solar panels were a good financial investment, neither of which were relevant to a social housing context. However, despite this the households in this study managed to mobilise new elements for the meaning of prosuming, but at the start they could easily have taken the rejection pathway. When a letter from the solar installer and the local authority came through offering free panels, many of the householders ignored it. Only by challenging the meaning of prosuming can we start to address issues such as solar entitlement.

Challenging norms

The Japanese environmental programme 'Cool Biz' highlighted how governments can be instrumental in shaping the elements associated with meanings ('Cool Biz, Japan', 2017). It was originally set up to address the rising energy demand in government buildings, but was intensified following the 2011 Japanese earthquake and tsunami that resulted in severe energy shortages as nuclear power stations were shut down (Ibid). One of the measures introduced by the Government was banning employees from changing the temperature of their offices if they were between 20 and 28 degrees Celsius (Ibid.). Instead, they encouraged employees to wear appropriate clothing to address their comfort needs rather than adjusting the heating or air conditioning. Even the Prime Minister was seen wearing casual clothes to reinforce the message (Ibid.). The policy helped to challenge the meaning of thermal comfort and what is acceptable to wear in an office (Shove et al., 2012).

Another example of an intervention to challenge norms is from East Africa. Shamba Shape Up is a reality television programme that encourages sustainable farming practices for small scale, subsistence farmers (Fox, 2015). Each programme focuses on a subsistence smallholding, 'shamba', and carries out a series of practical improvements with the farmer to help improve its sustainability. The programme, which has millions of viewers, includes funding from the public sector but also from not-for-profit and commercial sponsors. Both this, and Cool Biz, offer inspiration as to how to start to adapt different elements in order to challenge conventions.

4.2 The importance of variation

While this study of just seven households is tiny when set against the tens of thousands of solar PV homeowners in the UK, it offered a depth of analysis missing from many other solar PV studies. As Shove et al write: "understanding how local variations of performance and enactment accumulate and persist is an essential part of understanding the dynamics of practice" or in this case a project (2012, p. 126). What is more, this local variation is from a group of households who could not afford to purchase their own solar panels and were dependent on their social housing landlord to enable them to have access to the material element needed to become prosuming practitioners. As Shove et al also write "…the emergence, persistence and disappearance of practices (guided and structured by dominant projects) generates highly uneven landscapes of opportunity, and vastly unequal patterns of access" (2012, p. 135).

Such issues of access and who can mobilise the elements needed, are important in terms of future sustainability winners and losers (Walker, 2013). Those households who do not have the capital to invest in the material elements needed in a low carbon future - the energy efficient washing machine, triple glazed windows or, as in this case, solar panels - may well be left out in the cold. But even if they do have access to such material elements through government funding, it does not necessarily mean they will become sustainability winners. As Middlemiss and Gillard (2015) have highlighted, addressing fuel poverty is much more complex than simply ensuring a supply of energy efficiency technologies, as important as they are. In my research, while households could definitely not become prosumers without the material element, what was striking was just how important the other two elements - meanings and competence - were in enabling households to adopt the Prosuming Project. But this was not the end of the story, practitioners also had to orchestrate practices and projects to the fulfillment of the Prosuming Project that involved alignment with dominant projects.

However, once households had managed to mobilise the elements they needed and orchestrated practices and projects, in just a matter of a few weeks, prosuming shifted from being largely associated with affluent owner occupiers to becoming part of the material and social fabric of an urban social housing estate facing multiple deprivation issues. What also shifted over the course of the research was the meaning of what is good solar conduct (Bulkeley et al., 2016). For the social housing tenants it started out as being about saving money but over the course of the ten months research, good solar conduct also became associated with valuing a natural resource that is by no means abundant. Thus the Prosuming Project became associated with both not wanting to waste money - frugality - but also mottainai- not wanting to waste resources. The combined element, captures the desire of many the practitioners in this study to not waste solar power – in particular to keep it in the community in

which it was generated. Letting it escape to the distribution network was seen as a terrible waste of an opportunity to support households struggling to afford electricity.

And yet such meanings are also fragile. Until they take hold and start to spread across time and space, they may well remain in isolated geographic pockets. But the more diverse communities have access to the material element needed for prosuming and the chance to mobilise the other elements needed for performances, the more the Prosuming Project will start to transform. And, as Shove et al highlight it is not only about "who gets the opportunity to do what, but for who it is that shapes the future of a practice…" (2012, p. 73). Or in this case the evolution of a Shifting-Storing-Saving & Sharing Project that could radically transform communities who currently face being on the wrong side of the sustainability winners and losers divide.

4.3 The future's bright - the future's a Shifting-Storing-Saving & Sharing Project

After only ten months of the Prosuming Project a new project started to emerge - the Shifting-Saving-Storing & Sharing Project. It is still far from fully formed. For example, access to the solar panels is still generally restricted to those who can afford them as the cuts to the Feed-in-Tariff have stalled investment from social housing landlords (Howard, 2015; Tingey et al., 2017,Vaughan, 2016). But the landscape is fast changing as the prices for solar panels come down (Energy Savings Trust, 2017, Ingrams, 2017), and the cost of storage also appears to be heading in the same downward direction as investment in battery technology accelerates (Frankel and Wagner, 2017, Titcomb, 2017,Topham, 2017).

Over the summer of 2017, the distribution network operator UK Power Network undertook a consultation on changing from a distribution network operator to a distribution systems operator that will include not only providing the infrastructure to transport electricity but also enabling communities to generate, store, share and sell their energy locally (UK Power Network, 2017). This is still, however, a vision for the future, but in Germany it starting to happen. The Sonnen battery not only allows prosumers to store their excess solar power but also share it with others in an online energy community across the country. According to the company website it is the first truly decentralised energy community in the world:

> With a sonnenBatterie and a photovoltaic system you'll completely cover your own energy needs on sunny days - often even generating a surplus. This surplus is not fed into the conventional power grid, but into a virtual energy pool that serves other members in times when they cannot produce enough energy due to bad weather. A central software links up and monitors all sonnenCommunity members - while balancing energy supply and demand. As a

> sonnenCommunity member you don't need your conventional energy provider anymore - you are independent (Sonnen, 2016).

The company argues that by avoiding traditional commercial energy companies and their shareholders, both sellers and buyers get a better financial deal. This initiative seems to be one of the first examples where the formative elements of a Shifting-Saving-Storing & Sharing Project are beginning to circulate. However, given that the cost of a battery is nearly £1600, plus the price of solar panels that still runs into thousands, this does not appear to be a solution for addressing potential sustainability losers. And yet the website makes a point that this scheme is for all, even those who do not have solar panels can still purchase the solar electricity at the community rate, which the company claim is cheaper than mainstream providers. This is an exciting development and highlights the potential for a Shifting-Saving-Storing and Sharing Project for meeting the needs of different community members. The project reflects many of the ideas that, remarkably, Toffler developed nearly 40 years ago:

> When we combine new energy-generating technologies with new ways to store and transmit energy, the possibilities become ever more far-reaching…For much of its supply will come from renewable, rather than exhaustible sources. Instead of being dependent on highly concentrated fuels, it will draw on a variety of widely dispersed sources. Instead of depending so heavily on tightly centralised technologies, it will combine both centralised and decentralised energy production…And instead of being dangerously over-reliant on a handful of methods or sources, it will be radically diversified in form. This very diversity will make for less waste by allowing us to match the types and quality of energy produced to the increasingly varied needs (Toffler, 1980, p. 148)

If we are to truly avoid a future gap between sustainability winner and losers, it is important that all social groups have the opportunity to mobilise elements, including the solar panels and batteries, for a Shifting-Saving-Storing & Sharing Project. Only by ensuring diversity of practitioners and variations in project performances can we start to shape a low carbon future for all. As Shove and Pantzar write, "personal histories of practices are never entirely personal"(2007, p. 157).

4.4 And finally…

I, along with the seven households who so generously gave their time to take part in this research, have all been on a journey. Along the way we have all taken different paths at different times in our relationship with the Prosuming Project. For me, it involved aligning my PhD to the parallel world of pathways, projects and practise and in the process remembering my own memories of feeding the meter as a child. For the seven households who took part in this study they adopted a project that helped them, at different points, combine feeding the meter with family routines. Along the way they have demonstrated their skills, adaptability and resilience in performing the Prosuming Project within

the context of a economically disadvantaged community. Finally, I would like to leave the last words of this thesis to them:

> In the stress level … it works wonders. If there's only a couple of pounds on there, I know it's going to be fine until tomorrow. I haven't got to panic about …keep checking it, I know that that's going to be fine until tomorrow…these aspects are major, major improvements for us. Irene

> There have been times when I couldn't afford to do their washing. I've done it flipping hand washing just because I couldn't afford to run the washing machine but now I haven't got to worry about that.. 'Right kids, chuck it in'. Val

> We're on a council estate but it's a good community … I mean I've got a friend who lives over the back, she's on her own with two kids. She'd benefit from using that, you know, free electricity… there's a lot of people round here that would benefit from using that electricity. Frankie

APPENDICES

Appendix A First information sheet

US
University of Sussex

HERE COMES THE SUN - a study of the use of solar PV panels in UK households

WHAT'S HAPPENING?
My name is Nicolette Fox and I'm currently studying for a doctoral degree in energy studies at the University of Sussex looking at how solar photovoltaic PV panels are being used in UK homes. This autumn I am planning to speak to over a number of households like yourself, who either currently have solar PV panels or are about to have them installed. I am interested in why the households have the panels or why they are about to be installed. For those homes who have already got them, I am interested in whether or not the panels have had an influence on day to day routines, for example when you put your washing machine on.

WHY IS THIS RESEARCH BEING DONE?
The government has spent a lot of money in recent years trying to encourage households and landlords to invest in renewable energy. Solar PV panels have been the most popular renewable technology and hundreds of thousands of households have signed up to the Government's feed-in-tariff scheme or been involved through 'rent a roof' schemes. Despite the fact that many more homes have solar panels today, we still don't know very much about what happens to everyday life when they are installed. Do people watch out for the sun and then turn on their gadgets to make use of the renewable energy? Or do households forget they are there and just get on with their life as before? This study is one of the first in the country to look at this in detail.

WHAT DOES THE RESEARCH INVOLVE?
I will be talking to lots of different households who have solar panels of their roofs or are about to have them installed. Many of them will be in Sussex but there will also be others around the country. Some of these interviews will take place over the phone, others face to face. I am interested in finding out what you think about the solar panels and whether they have impacted in any way on how you use electricity in the home and your day to day routines. The informal conversation will last from 45 mins to 1.5 hours and will be arranged at a time that will suit you.

Just for your information, stage 2 of the research will involve working with just a handful of families who are about to have solar panels installed. It will involve around four visits spread over a year looking at whether day to day routines change or not as a result of the installation of solar panels. If you are interested in finding out more about this part of the research, I am happy to provide an additional information sheet.

WHAT IF I CHANGE MY MIND?
It is entirely up to you whether you would like to take part. In addition, even if you do agree you are able to change your mind at any time and stop taking part in the study. You also don't need to have a reason for not taking part, we absolutely respect your decision. If you decide you would like to withdraw your information from the study, even though it will be anonymous, this too is okay, right

up until December 2014. After this the final chapters of the research report will be written. My research has been approved by the Ethics Committee at the University of Sussex (contact email: crec-ss@sussex.ac.uk).

WHAT HAPPENS TO THE INFORMATION YOU PROVIDE?

If you are happy to take part, everything you say and the information you provide will be stored safely and securely so only myself and my supervisors Professor Jim Watson and Dr Sabine Hielscher will have access to it. The interviews will be audio recorded and then professionally transcribed by the University of Sussex. Even though the interviews won't be about sensitive issues, we will assume that the householder would like to remain anonymous, unless you tell us otherwise, and each transcription will be identified by a number rather than a name. I will use the transcripts as part of my overall research and will draw on this material when writing my thesis and other publications - but there will be no way of identifying the real people. I will also write a brief summary of my research findings so you can see what I have found out from the research.

WHAT NEXT?

You can let me know directly whether you are happy to find out more about the study, or **insert details** can tell me. Either way if you are happy to find out more, I will give you a call so I can answer any questions, and if still interested we can arrange a convenient time for an informal interview. Many thanks for your interest.

CONTACT DETAILS: For further information please contact Nicolette Fox insert details or her supervisor Dr Sabine Hielscher insert details

Appendix B Second information sheet

University of Sussex

Here comes the sun - a study of the use of solar PV panels in UK households

INTRODUCTION

Thank you for expressing an interest in finding out more about the second stage of the research. As you know the first stage was about talking to a wide range of households about their thoughts on solar photovoltaic PV panels. This second stage is about understanding just what it is like to have a solar panel installed and how it may or may not change day-to-day routines in the home.

Despite the fact that many more homes have solar panels today, we still don't know very much about what happens to everyday life when they are installed. Do people watch out for the sun and then turn on their gadgets to make use of the renewable energy? Or do families forget they are there and just get on with their life as before? This study is one of the first in the country to look at this in detail.

This second stage involves more in-depth research with a small number of households over a maximum of a year and will include interviews both before and after the solar panels are installed. This research will be one of the first studies in the UK looking in detail at the impact that solar panels have on households.

WHAT DOES THE RESEARCH INVOLVE?

I am planning to work with around six households over a nine to 12 month period . Although this sounds a long time, I am only planning around four visits spread over this period. As I am looking at solar energy it is important that I reflect the different seasons in my research as this will influence how much energy is being generated and if and how it is used.

The first visit will be before the solar panels are installed and will be an opportunity to meet you all and discuss your thoughts about energy use in the home. The second visit will be shortly after the installation to get your initial reactions to the technology. The other two visits will then be six to nine months after the installation to see if the solar panels have impacted on your domestic routines or not.

Each visit will take approximately a couple of hours. If possible, I would like to include in my study both adults and young people over the age of 12. The reason why I am interested in talking to young people is that there have been very few energy studies about this age group and I believe it is important to hear what have they to say. If it is not convenient to get everyone together at the same time, I am happy to come back at a more suitable time.

WHAT WILL HAPPEN?

After the first visit, each time I come to your house I would like to have an **informal chat** about the solar panels and how they have or haven't changed day to day routines in the house, such as when you put the washing machine on. I am also interested in how easy or hard it is to use the solar energy you have generated.

In addition to these chats, I am also looking at other ways of understanding energy use in the home. For example, other researchers have successfully used **'energy walks'** led by the householders. This gives householders an opportunity to highlight different aspects of energy in the home or garden, for example the solar panel equipment or a particular appliance which is either very energy efficient or inefficient. As you are leading the energy walk it is up to you where you go within your home or

garden. Sometimes video cameras are used to record the walk for research purposes, but again that's up to you.

In between my visits, it would be helpful if you or other household members were occasionally able to record your thoughts on energy use in the home. The idea would be to produce an occasional **'energy diary'** that lasts just a few days. It could either be hand written or typed, or if you prefer you could produce a 'video diary'. During the week when you produce the diary I will send a few texts to prompt entries. For example, inviting you to write about your favourite electrical appliance or particular energy 'hot spots' in the home. If you are using video it would be helpful if you could avoid filming faces - either your own or others in order to protect confidentiality. This is particularly important if children and young people are involved. Again there will be plenty of opportunities to discuss this further. The idea is to have fun with the energy diaries rather than feeling it is a chore!

Once the energy walks and diaries are completed, I would like the opportunity to share some or all of the material amongst family members - but only if you are happy to do this. If you are, I will arrange a meeting where we can look together at the material and have a discussion around it. [22]

WHAT HAPPENS IF I CHANGE MY MIND?

It is entirely up to you whether you would like to take part. And even if you do agree you are also able to change your mind at any time and stop taking part in the study. You also don't need to have a reason for not taking part, we absolutely respect your decision. If for any reason you decide you would like to withdraw your information from the study, even though it will be anonymous, this too is okay right up until December 2014. After this the final chapters of the research report will have been written.

WHAT HAPPENS TO THE MATERIAL

If you are happy to take part, everything you say and the information you provide will be stored safely and securely so only myself and my supervisors Professor Jim Watson and Dr Sabine Hielscher will have access to it. The **interviews, energy walks and energy video diaries** will be **audio recorded** and then **professionally transcribed** by the University of Sussex. Each transcription will be identified by a number and your name or details will not be associated with it. The written energy diaries will also be identified by a number and not a name.

I will use the transcripts and energy diaries as part of my overall research and will draw on this material when writing my the thesis and other publications. Nobody will be able to identify you within the thesis or publications as I will not use your name or any possible identifying features such as your employer.

However, there is the potential for identification if the videos are shown as part of the research, even though I am encouraging households to avoid filming faces. Given this, I will not reproduce the videos unless you are absolutely happy for me to do so. You will have an opportunity to have a look at the videos and decide whether you are happy for all or part of the videos to be reproduced for educational purposes, such as within my thesis or for a conference. This is entirely up to you and the research does not depend on the videos being shown.

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[22] **Thesis note:** As discussed in Chapter 4 and 5, I decided to not pursue the energy walks as the method felt too intrusive. Additionally, as highlighted in the information sheet, I had originally planned to send a series of texts as prompts for the interviewees to help the households potentially reflect on the solar power using a diary format. However, in the end I also did not pursue the texts as I felt they would make additional demands on the households who were already generously giving their time for the serial interviews. My research funding provided each household with an Apple iPad and they were notified of this after they had signed their consent forms for taking part in the study as I did not want to unduly influence their decision to take part. This was a gift in lieu of the time they had offered to give to the study, but also could be used to record their thoughts on the solar panels, between interviews. As only a small number of the households sometimes used the iPads in this way, I did not include these reflections in my analysis.

FINDING OUT MORE If you have any questions about taking part, or at a later date would like to withdraw from the study, please contact Nicolette [**input email address and telephone number**] or her supervisor Sabine [**input email address]**.

This project has been approved by the University of Sussex's Science and Technology Cross-School Research Committee. For further information contact: crecscitech@sussex.ac.uk

Appendix C Consent form

CONSENT FORM FOR PROJECT PARTICIPANTS

Project title: HERE COMES THE SUN - a study of the use of solar PV panels in UK households

This project has been approved by the University of Sussex's Science and Technology Cross-School Research Committee.

Reference…….

For further information contact: crecscitech@sussex.ac.uk

I understand that agreeing to take part means that I am willing to be interviewed by the researcher and that:

- I have had the project explained to me and I have read and understood the attached Information Sheet for the 9-12 month study, which I may keep for records.
- I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalised or disadvantaged in any way.
- I can also withdraw my information at any time up until December 2014.
- I consent to the processing of my personal information for the purposes of this research study. I understand that such information will be treated as strictly confidential and handled in accordance with the Data Protection Act 1998.
- I understand that the interviews will be transcribed by a professional transcriber who has signed a confidentiality agreement.
- If **video cameras** are used these will only be for informing the study, unless I gie my full consent at a later date for clips to be shown as part of a PhD thesis and other related publications.
- I understand that any information I provide is confidential, and that any information that I disclose **will not lead to the identification** of any individual in the reports on the project, either by the researcher or by any other party.
- However, I realise that there is a possibility that if video clips are shown this may lead to identification. I will only consider consent once I have been shown the videos by the researcher and I retain the right to say no to them being shown, or to change my mind and later withdraw consent up until December 2014.

If you are happy with the above statements please fill out your details below and sign. I will discuss with you how best to get the form back to me, either by my collecting it from you or by sending it to Dr Sabine Hielscher, Sussex Energy Group, Science and Technology Policy Research, Jubilee Building, University of Sussex, Falmer, Brighton BN1 9SL.

Name……

Address……

……

……

Signature……Date……

<u>For those under 18 years:</u>

Age of young person……

Name of parent/guardian……

Address……

……

……

Signature……Date……

With your permission, we would like to store this information for future researchers to potentially use, again with all names removed, but this is not a requirement for taking part in the study. **I am happy for my information, with names removed, to be stored for potential use in the future YES, NO (cross out or delete as appropriate).**

For further information contact Nicolette Fox via email (add) or call or text (add)

Appendix D Topic guide

Topic guide – 'Prosuming'

Any questions? Tape recording?

1 Introduction

Thank you for your willingness to participate in my research project. Your participation is very much appreciated. You have read and signed the consent form so you know what the research is about and how it will treat things you say. You also know you can decide to withdraw from the study at any time.

In my research project I am interested in investigating whether and how solar panels impact on our day to day routines or not, such as when we turn the washing machine on.

This will be a pretty relaxed and informal interview - I have prepared a few topics but only for my own guidance:

PROMPTS
That's interesting can you tell me more
What do you mean
What do others think
Can you explain this further please

2 Background for groups 1 & 2

- How many people live in this household?
- What are their ages?
- Do the adults work?
    - Yes - what do they do for a living
- Do you or any of the adults work from home - some or all of the time ?
- How often are different members of the family at home during the day?
- How long have you lived in your house?
- On a scale of 1 to 10 how green/environmental would you consider you are? 1 unaware – 10 very aware?
- On a scale of 1 to 10 how energy aware are you? 1 unaware - 10 very aware?
- How many energy efficient light bulbs do you have roughly ?
    0 to 5
    5 to 10
    Over 10

- Have you installed any other energy efficiency measures in your home, for example cavity wall insulation? Please explain?

- Have you any idea how much money has been saved by generating your own electricity? (possibly see bills – before and after?)

3 Guided general topic guides for groups 1 & 2

Solar panels

- How did you end up with solar panels?
- Tell me about the process of getting them installed?
- Could the installation have been improved?
- Would you do it any other way now?

How to get the most out of the solar panels

- How much do you know about solar panels?
- Were you given information on how to get the most out of the solar panels (would it be possible to see that sometime)?

- How else have you found out?
- What information would you have liked to have had to get most out of solar panels?
- Who should be providing this information, eg solar companies, local council, government etc?
- Would you recommend it to friends, families, colleagues?

Technologies

- Have you bought anything that helps you use the solar power eg batteries, phone aps, boiler, electric car?
- Can you tell me more about these - have they made a difference? How?
- What gadgets/technologies would help you get more out of the solar panels?

Impact on everyday life and routines

- Do you think you are getting the best out of the solar panels?
- Has the renewable energy you generated had any impact on how you do things in the house?
- Can you explain this further?
- Would you like to do more?
- What is stopping you?
- Has the renewable energy had any impact on the timing of routines?
- Are there any problems with this?
- What are the advantages and disadvantages of renewable energy?
- Has it meant housework is harder (what about for different household members)?
- Do you think you might be using more electricity as it is free?
- Has this impacted on your routines when it is not sunny?
- Does it help with using the sun's energy by being at home during the day?

Family dynamics

- Does your house have any particular household rules on energy use?
- How about unspoken rules?
- Do any other general household rules impact on energy [eg having tv's in room or not?]
- Are there any tensions about energy use in the homes?
- How has the renewable energy impacted on different household members?
- Explore what the young people in the house (12 years upwards) feel about the solar panels. Eg has it made any difference to their routines in the home?
- Who benefits from the solar panels?
- Does anyone lose out? Eg is it hard worker to fit round the sun?
- If you don't pay the energy bills do you think you mind whether energy is reduced or not?

Impact of microgeneration

- Has generating renewable energy encouraged you to cut back on energy use in the home?
- Have you saved money?
- Has it encouraged you to be more energy efficient?
- Has prosuming changed other domestic routines eg recycling more?
- How important is it to maximise the use of the free electricity?
- How far do you go to ensure this?

Relationship with energy in the home

- How concerned are you about energy use in the home
- Where would you describe as an 'energy hotspot'
- Why is this
- What are you most energy intensive appliances
- Does it impact on how you use them
- What is your most favourite appliance
- Why is this
- If energy costs trebled would this affect how you use this appliance
- What about other appliances in the home

Other areas to look at:

- The diffusion of 'prosuming' eg have neighbours learnt from each other?
- How could prosuming be improved, eg simple literature about how to use the system ?
- The role of metering?
- How the householder sees themselves in the future, eg are they interested in becoming more skilled at prosuming?
- Talk about unconscious habits – such as turning lights on and off?, compared with conscious decisions eg buying solar panels
- How easy/difficult it is to change these?
- Have you adapted skills from other areas of life eg economy 7 ?

4 Role of 'prosumers' of solar energy - Group 3

Competencies

Discuss the potential skills involved in getting the best out of prosuming.
What about for solar power - how empowered do householders feel?

Materials

Discuss the different objects/technologies that could help with prosuming eg batteries, hot water cylinders, under floor electric heating, electric cars. How are technologies changing?

Meanings

What does 'prosuming' mean. Eg is it associated with being frugal or about making money (feed in tariffs)?
What about self-sufficiency and cutting carbon?
Does it mean being 'green' and doing the right thing for the household and the environment?

Socio-economic & institutional factors

- What about the double dividend - renewable energy and behavioural change?
- Energy prices
- Feed in tariff policy
- Behavioural policies
- Green Deal
- Link to wider environmental policies eg energy efficiency
- Links to addressing fuel poverty

Power industry

- How important are prosumers to low carbon world?
- How important is it that they consume own energy/offer it up to the grid?
- What about the double dividend?
- How do we compare to what is happening in Australia?
- Benefits of prosumers? Any negatives?

Solar industry

- Impact of govt policies?
- Where are we now?
- What does the future look like?
- How do solar panels link into other energy efficient measures?
- Are consumers changing in how use panels?
- Private versus rent a roof - differences and similarities?
- How technology may change everything ? EgRole of batteries?
- Suggestion in Australia it won't be long before companies paying households to install panels. Your thoughts?

Any other important areas not covered?

Appendix E Sample interview checklist

UPDATE - SINCE LAST MET eg:

- Who has been involved in using solar power
- Impact on routines and family life
- Have you got the best out of the panels, how or why not
- Could you have done more - and how difficult would this be
- In financial terms how have you benefited – how savings used
- Impact on prepayment meter
- Any other benefits
- Impact of weather and seasons

PRACTICES

Talk through performances and if they have changed since getting solar power e.g.

- Washing
- Drying
- Ironing
- Cooking
- ICT – computers, related practices
- Lighting

ELEMENTS

Materials e.g.

- Role of prepayment meter and solar energy monitor
- Anything else?

Meanings e.g.

- What does producing and using your own solar energy mean to you
- Has this changed at all since getting solar panels

Competencies e.g.

- How got the best out of the solar power
- Has it influenced other areas in the house

ENGAGING WITH PROSUMING

- Shifting energy
- Reducing energy
- Storing energy
- Capturing energy
- Sharing energy

Appendix F Sample NVIVO codes

Snap shot of **NVIVO codes generated using an inductive and deductive approach**		
ELEMENTS		
COMPETENCES	**MEANINGS**	**MATERIALS**
1. Knowhow 2. Embodied skills 3. Information 4. Lack of information 5. Poor knowledge 6. Confusion 7. Sharing Knowledge 8. Social media 9. Solar installers 10. Frustration 11. Confidence 12. Reading the weather 13. Lack of access to meter 14. Keeping with new routines 15. Stopping new routines 16. Learning as you go 17. Peer to peer 18. Education 19. Staggering appliances 20. Can't feel or see solar 21. Sun as cue	1. Money saving 2. Environment 3. Media 4. 'Posh' 5. Not 'poor' 6. Challenging conventions 7. Not challenging conventions 8. Some control 9. Weather and feelings 10. Future vision e.g. electric cars 11. Annoyed by solar in winter 12. Trust in prosuming	1. Energy monitor 2. Lack of energy monitor 3. Solar generation meter access 4. Novelty 5. Novelty wears off 6. Control 7. Standby issues 8. Prepayment meter 9. House size 10. Garden size 11. Loft clearance for PV 12. Lack of batteries 13. Lack of access to meter - loft

INSTITUTIONAL PRESSURES	
FAMILY & WORK	**ECONOMY**
1. Children 2. Teenagers 3. Family life/family first 4. Hectic life 5. Saving time 6. Single parent 7. Traditions despite the expense 8. Stress 9. Sharing knowledge 10. Time pressures 11. Class 12. Energy needs 13. Part time work 14. Shift work 15. Flexibility to adapt 16. Do more chores because of sun 17. Don't get listened to 18. Not slave to solar 19. Distrust of institutions 20. Shift work 21. Practice memories 22. Family first, energy saving second	1. Money worries 2. Saving money 3. No longer saving 4. Food versus energy 5. Heating 6. Wasting solar to grid 7. Time of use 8. Seasonal savings 9. Take control 10. Solar to grid (who benefits?) 11. Powerless to energy companies 12. Ripped off 13. Taking control over energy companies 14. Specific energy needs 15. Go off grid 16. Financial routines 17. High energy bills 18. Prepayment tariffs 19. Low income 20. Heat or eat type decisions 21. Lack of control 22. Prepayment meter & solar 23. Resourceful 24. Lack of safety net 25. Reducing energy 26. Reducing vulnerability fuel poverty 27. Feed-in-Tariffs – who benefits 28. Wasting energy

RHYTHMS	**DISRUPTION TO RHYTHMS**
1. Timings 2. Daytime availability 3. Shift work 4. Flexibility to adapt 5. Seasonal saving of money 6. Not slave to solar 7. Financial routines (paying off debt 8. New routines 9. Benefits of new routines e.g. leisure time 10. Seasons 11. Daylight and artificial lighting 12. 24/7 patterns 13. Stress 14. Family first 15. Trade off with new practices 16. Behaviour change conflicts 17. Continue with new practices?	1. Seasons 2. Breaking routines 3. School holidays 4. Celebrations 5. New technologies e.g. solar PV 6. Flexibility to adapt 7. Positive 8. Negative e.g. away from domestic chores but then have to pay for it when come back 9. Life events 10. Weather patterns 11. Visitors 12. Take control?
OTHER 1. Role of the council/social housing landlord 2. Role of energy companies 3. Specific energy needs 4. Culture 5. Council reinvest profits 6. Community	

Clothes washing practices 1. Temperature 2. Boils 3. Script of machine 4. Frequency 5. Timing 6. Who does it 7. How dirty? 8. How often wash clothes 9. Cleanliness conventions 10. Wash routines 11. Cultural context 12. Practice memories 13. Timer **Drying practices** 1. Weather 2. Line drying including senses 3. Convenience 4. Tumble dryer as iron 5. Sensory - softness of tumble drying 6. Space in house/garden 7. Underwear and line 8. Practice memory 9. Condensation 10. Untidiness clothes drying on radiators **{Citation}**	**Ironing practices** 1. Tumble dryer as iron 2. Folding 3. Ironing 4. Getting by Practice memory **Cooking prep** 1. Work/School schedules 2. Teenagers/children 3. Routines 4. Effort 5. Time pressure 6. Practice memory **Leisure/ICT** 1. Standby 2. Charging 3. Televisions/computers/mobile phones 4. Teenagers 5. Work/school schedules 6. Relaxation 7. Practice memory 8. External play 9. Internal play 10. Games consoles 11. Too many plugs 12. Can't turn off	**Lighting practices** **1.** Day to day 2. Xmas 3. Energy bulbs 4. Daylight hours 5. Forget to turn off 6. Teenagers 7. Practice memories **Other practices** 1. Cooling & fans 2. Vacuuming

Appendix G Individual practitioner pathways

The following pages summarise the individual pathways for each of the seven prosuming project-practitioners:

Irene's household
Irene and Tony have four children aged between 4 and 15 years old. Both parents are often at home during the day due to childcare and periods of unemployment and childcare. Irene carries out all the laundering, cooking and cleaning in the house, while Tony undertakes household 'DIY' projects.
Adopting – Tentative Prosumer
Irene did not initially believe the offer of free solar panels. However, once convinced by the solar installers it was a genuine offer, she deferred to her husband Tony as the expert on this issue. However, quite quickly, Irene not Tony emerged as the primary prosuming practitioner. It was she who mobilised the elements for adoption, including turning to the prepayment electricity meter to test out the Prosuming Project.
Establishing – Periodic Prosumer
Irene concentrated on orchestrating her laundering practices to the Prosuming Project. What also stood out during this period was how she deferred to her husband Tony as the expert even though she was the main practitioner in the household. While Irene was keen to perform the project because of the financial savings she was beginning to make, it was initially hard to keep to the new routines - particularly with variable weather. However, as the months elapsed and autumn turned to winter she began to further embed the Prosuming Project in her daily path, as she saw the benefits it was making to the household and she segued from establishing to the committing stage.
Committing – Transformative Prosumer
By steadily performing the Prosuming Project, Irene grew in confidence as a practitioner. As the winter set in she embraced this seasonal change by returning once more to her prepayment electricity meter. She started to regularly record what appliances she had used, as well as the weather and how much was left on the prepayment meter. Monitoring and 'doing' the Prosuming Project started to morph together and gave her the embodied knowledge to experiment further and become a transformative prosumer. As she became a more experienced practitioner so she looked to embrace new practices to her performances and in the process started to redefine what it could mean to be a prosumer that went well beyond saving money - as important as this was. For example, Irene increasingly turned to her washing line because she liked the idea of using the sun's energy directly, even if she could have dried her clothes for free in the tumble dryer using the solar power. However, she also adapted the practice of air drying to accommodate the expectations of her children. Due to eczema they disliked the texture of air dried clothes, so Irene now ended her line drying practice with a quick blast in the tumble dryer to soften the textures. Remarkably, by consistently but also creatively deepening her practice, Irene saved significance sums over the winter – sometimes £15 in a week. During the committing stage of the project, Irene finally acknowledged that she was the energy expert in the household because of the skills she had developed with the Prosuming Project.. She also found that the solar energy monitor from the social housing landlord, installed half way through winter, was interesting but mainly acted as reassurance that she was an accomplished prosuming practitioner. Irene was proud of her achievements.

Frankie's household

Frankie and her husband Neil have three girls aged from 4 to 12 years old. During the day, if there is work, she has a part-time job, and combines this with looking after her youngest child who is not yet at school but attends nursery for some of the week. Neil works full time and Frankie carries out all the laundering, cooking and cleaning routines within the home, as well as ferrying children to various after school activities.

Adopting – Tentative Prosumer

Frankie had a friend who had solar panels so from the outset the meaning element for her was that social housing tenants have a solar entitlement. Frankie also found it easy to access the competence element as for her the solar installer's advice was straightforward - a sunny day equals power so use your appliances. However, like the other householders she too used the prepayment meter as an additional material element to help her check she was supporting her Feeding-the-Meter Project. For Frankie the adoption period was swift and she quickly moved to being a periodic prosumer and crossing from adoption to the establishing stage.

Establishing – Periodic Prosumer

Frankie loved being a prosuming practitioner and, where possible within her busy daily paths, carried out regular performances. Washing and drying were the main practices that she orchestrated to the Prosuming Project. Her performances were reinforced by the significant financial savings she was seeing - over the summer reducing from £30 a week on the electricity prepayment meter to just £10 in some weeks. Yet despite her fairly regular performances, as winter set in in they became intermittent and then ceased altogether. Her mantra - sunshine equals solar power - no longer served her well and as a result she stopped orchestrating her laundering practice to the project, becoming a seasonal periodic prosumer.

Committing – Transformative Prosumer

For Frankie, the solar energy monitor made a significant difference. It transformed her experience and enabled her to move during the winter from being a seasonal periodic prosumer to a transformative prosumer. During the establishing phase, Frankie did not have the embodied knowledge that solar savings could be made over the winter. She stuck to the mantra that sunshine equals power so when there were very few sunny days she assumed that she could no longer perform the Prosuming Project. In her own words she was "heartbroken". But the arrival of the solar energy monitor instantly transformed this, when she discovered that solar power was being generated on some days over winter. It did not matter that this was nowhere near as frequently as during the summer, what was important is that she had this knowledge that she could choose to act upon. Thus, Frankie once again put energy and enthusiasm into her performances, even sharing her free solar power with friends by periodically doing their washing for them.

Val's household
Val is divorced and has two children aged 9 and 12 years old, one with a registered disability. Val is a full time carer and carries out all the household chores on her own.
Adopting – Tentative Prosumer
Val, like many of the other households, did not believe the solar PV offer, and it took the solar company knocking on her door for her to be convinced. She also struggled with the competence element and even following a discussion with the solar surveyor, was left believing that it is best to use appliances at night to utilise the solar power. However, by drawing on her skills and knowledge from the Feeding-the-Meter Project, she quickly worked out how to use the solar power and adopted the Prosuming Project.
Establishing – Periodic Prosumer
Of all the practitioners, Val was the most profoundly affected by the Prosuming Project during the establishing phase. When her husband left, so did the security of being able to know she could afford to use electricity without constantly checking the prepayment meter. But this changed once she had adopted and started to establish prosuming in her daily path over the summer. The money she saved on her electricity costs gave her extra money in her pocket - she no longer regularly ran out of cash the weekend before her benefits arrived. Additionally, the Prosuming Project also meant she could use the solar power to increase her performance of washing, as well as adapt the practice. Thus she could wash her children's clothes more frequently, as well as having separate washes for white and coloured items. Val assumed she would be able to continue to perform prosuming over the winter, and was disappointed when she stopped saving money on her prepayment meter. Given this, she stopped adapting her laundering practices to daytime performances. Initially, Val was negative about the experience and frustrated by no longer saving money, but this started to change once spring arrived and she started to prosume again. Val remained a periodic seasonal prosumer.
Committing – Transformative Prosumer
Not applicable

Barbara's household
Barbara lives with her husband John and has a 15-year-old son. She works part time with regular hours each week. John is often at work, but with a zero hours contract can sometimes be at home. Barbara carries out all the cooking and the majority of laundering, although John also helps with domestic routines when he is around.
Adopting – Tentative Prosumer
Barbara also did not believe the original letter offering the solar panels and ignored it. And again it took the solar installation company knocking on her door to convince her that it was a genuine offer. Again the meaning of prosuming was associated with 'poshness' and eco-homes, not social housing. However, like Frankie, Barbara appreciated the simple 'know-how' type explanation from her installer - sun equals power. But she was more cautious and carried out a test before adopting the Prosuming Project, as well as continuing to monitor it, from time to time, using the prepayment meter.
Establishing – Periodic Prosumer
Barbara started to prefer her new daytime routines as it gave me her time in the evening to relax rather than feel she had to undertake certain domestic tasks. In terms of the opportunistic use of the solar power, she was tempted to use her tumble dryer more often because of the convenience. But Barbara also felt uncomfortable using it on a sunny day because it did not feel right - frugality ran deep. Similarly, she would never run the washing machine with a half load. Even with free solar power she saw this as a waste of resources. Like Irene, Barbara increasingly embedded the Prosuming Project into her daily path and moved from the establishing to the committing stage.
Committing – Transformative Prosumer
Barbara simply kept on performing the Prosuming Project and in the process became committed to it. She kept up her daytime routines all year round, because it not only helped with the Feeding-the-Meter Project but also with the Maintaining-Family-Routines Project. Barbara liked the fact that now she made sure that her washing and a number of other domestic chores were undertaken during the day rather than in the evening. She also welcomed the solar energy monitor as it gave her additional knowledge about solar generation and consumption. Barbara was surprised how much energy could still be generated even if it was not sunny; she felt that this would further improve her performance on grey days. While Barbara did not push at the boundaries of the Prosuming Project like the other three committed practitioners, it was still a transformative process for her. In particular, her daily path was transformed as she found space in it to accommodate the Prosuming Project. This enabled her to have the space to relax in the evenings thus meeting a personal need but also fulfilling the institutional projects of Feeding-the-Meter and Maintaining-Family-Routines.

Maggie's household
Maggie and Harry live together and have a ten-year-old daughter who has a registered disability. Maggie does not work outside the home and Harry has a part-time job. They share the laundering and cleaning of the house, while Maggie carries out most of the cooking.
Adopting – Tentative Prosumer
Maggie was initially excited by the prospect of adopting the Prosuming Project and persuaded her partner Harry to have the solar panels fitted, as well as encouraging friends and neighbours to sign up to the scheme. However, she and Harry found the explanation from the solar installer and, their accompanying letter, unclear. Instead, Harry used the prepayment meter to work out how best to use the system in order to adopt the project.
Establishing – Periodic Prosumer
The more the weeks went by, the more Maggie struggled with being a prosumer. She increasingly saw it as an infringement of her time and another task to undertake to fit into her busy daily path. During the establishing phase she grew to resent the Prosuming Project - why should she stay in to do the washing on a sunny day? Months later, after she had defected from the Prosuming Project, she shared in the interviews just how difficult her life had been during this time. Institutional projects were a heavy load on her shoulders particularly trying to manage the educational difficulties her daughter was facing, as well as wider family issues. There was simply no space in her daily path for the secondary Prosuming Project - neither physically or emotionally. Harry instead took on the role of project practitioner for the household and yet he too was not comfortable committing to it given the different commitments in his daily path. While Harry did not defect, he took an extended break over the winter as a periodic prosumer.
Committing – Transformative Prosumer
Not applicable

Zoe's household
The couple have three children 15, 17 and 19 years old. Zoe works part time and her shifts vary each week. Will but does not live in the family home. Zoe carries out the majority of household chores but does have help from her children. Her oldest daughter shares a lot of the laundering.
Adopting – Tentative Prosumer
Zoe was initially concerned that the Prosuming Project would be yet another domestic task she would have to undertake, and be difficult to fit into her busy day, which included shift work. However, although Zoe was the main project-practitioner, she often shared the performances with her 19 year old daughter, Tracey. Zoe felt she initially did not have the information needed to be a prosumer. However, as the weeks went back she gained in confidence in using the prepayment meter, and working out with Tracey, how best to access the power.
Establishing – Periodic Prosumer
Although Zoe had a slow start to being a prosuming practitioner, she warmed to the project as she developed her skill set. She stood out amongst the households for batch cooking during her day off. She not only saved electricity but also food costs as she would buy from a local market. The Prosuming Project also started to attract the interest of two of her older children - in particular Tracey who could see the financial savings they were beginning to make as a household. So an informal partnership developed whereas Zoe would put on a wash before she went to work, and her daughter would finish it off in the tumble dryer. Both Zoe and Tracey found themselves developing shared performances that helped not only fulfil the Prosuming Project but also meet some of the objectives of the Feeding-the-Meter and Maintaining-Family-Routines projects. They both moved from establishing to the committing stage.
Committing – Transformative Prosumer
Zoe and her daughter Tracey continued their prosuming performances over the winter, although they did stop during the Christmas break. For most of the winter they saw some savings on their energy costs. In fact, over a couple of weeks in November, Zoe noticed that she had stopped making savings which alerted her to the fact that her solar panels were not working. However, it was the breakdown of the tumble dryer that accelerated the transformative effect of the Prosuming Project. Instead of spending a few pounds fixing it, the family decided to replace it with a washing line and trips to the local launderette. Again, like Irene this was not just about saving money, although a key component, it was also about engaging with energy differently. Tracey liked the idea of using sunlight rather than always relying on an energy intensive appliance - even if it was being run at times with solar power. The solar energy monitor reinforced this commitment and added to their knowledge. Tracey and her brother Ben found it helpful as a reminder of how much energy they were using, as well as when they were generating it. Additionally, by committing to the Prosuming Project, laundering practices changed even further. For example, with no tumble dryer Tracey thought twice about whether an item of clothes really needed to be washed. Zoe also stopped picking up clothes off the floor of her children's bedroom - she only washed clothes in the basket.

Ed's household
The couple have four children, with the youngest two, aged 14 and 19 still at home. Ed works full time with night shifts and Jane has two part-time jobs and often also works shifts. They both share the laundry, cooking and cleaning activities.
Adopting – Tentative Prosumer
Ed was keen to have the solar panels installed, and also used his prepayment meter to carry out a series of tests on how best to use the power. But unlike the other six households, in his case the tests pointed to a problem with the Prosuming Project as it was not supporting his Feeding-the-Meter Project. Ed increasingly became disappointed and disillusioned with the scheme and started to question who was benefiting from it. It took an extra visit from the solar installer to convince Ed the system was working and be given the tailored advice to enable him to adopt the project. He discovered that his, and his wife's shift work was limiting their ability to orchestrate practices to the Prosuming Project. However, following the visit, Ed had the knowledge he needed to adopt the Prosuming Project but also lowered his expectations of it.
Establishing – Periodic Prosumer
During adoption, Ed had an extra visit from the solar installer to check his system was working. The installer gave him more tailored information about how to use the solar power including the advice that an old empty freezer was wasting electricity. Ed also realised that he was not seeing the benefits of the power as neither he nor his wife Jane were rarely around during the day due to shift work. Ed used the new knowledge from the solar installer to start a conversation with his family about household energy practices. He realised that one reason why the electricity bills had become so high, was that he had a number of family members staying for a few months so the electric cooker and washing machine were being heavily used. Following discussions with his family, they all said they would try and adapt their practices to take advantage of solar generation during the day and be even more mindful of not wasting energy. For Ed the Prosuming Project became more closely associated with energy saving rather than simultaneously producing and consuming solar power, although like a number of the others, Ed still saw prosuming as a seasonal project.
Committing – Transformative Prosumer
Not applicable

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